

YB 17413

LIBRARY  
OF THE  
UNIVERSITY OF CALIFORNIA.  
GIFT OF

*John Swett*

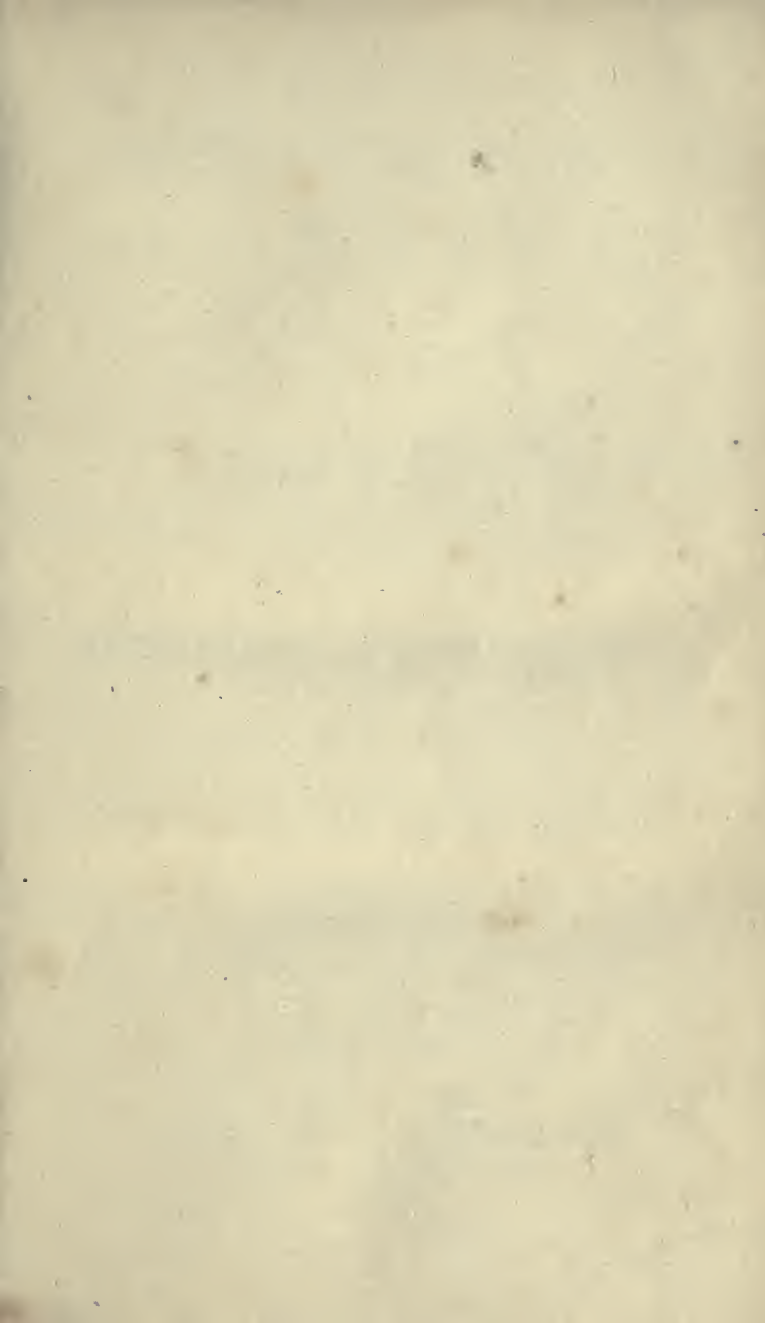
Received *Sept*, 1897.

Accession No. *67531* . Class No. *344*.











Digitized by the Internet Archive  
in 2007 with funding from  
Microsoft Corporation

ROBINSON'S MATHEMATICAL SERIES.

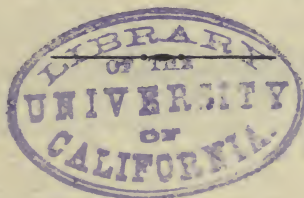
K E Y

TO THE

PROGRESSIVE

HIGHER ARITHMETIC.

FOR TEACHERS AND PRIVATE LEARNERS.



NEW YORK:

IVISON, PHINNEY, BLAKEMAN & CO.

CHICAGO: S. C. GRIGGS & CO.

1866.

04102  
R56  
ROBINSON'S

# Series of Mathematics,

*The most COMPLETE, most PRACTICAL, and most SCIENTIFIC SERIES of  
MATHEMATICAL TEXT-BOOKS ever issued in this country.*

(IN TWENTY-TWO VOLUMES.)

675.3.1

- |        |   |   |   |   |   |   |   |
|--------|---|---|---|---|---|---|---|
| I.     | Robinson's Progressive Table Book.  | - | - | - | - | - | - |
| II.    | Robinson's Progressive Primary Arithmetic,  | - | - | - | - | - | - |
| III.   | Robinson's Progressive Intellectual Arithmetic,   | - | - | - | - | - | - |
| IV.    | Robinson's Rudiments of Written Arithmetic,   | - | - | - | - | - | - |
| V.     | Robinson's Progressive Practical Arithmetic,  | - | - | - | - | - | - |
| VI.    | Robinson's Key to Practical Arithmetic.   | - | - | - | - | - | - |
| VII.   | Robinson's Progressive Higher Arithmetic,   | - | - | - | - | - | - |
| VIII.  | Robinson's Key to Higher Arithmetic,  | - | - | - | - | - | - |
| IX.    | Robinson's New Elementary Algebra,  | - | - | - | - | - | - |
| X.     | Robinson's Key to Elementary Algebra,   | - | - | - | - | - | - |
| XI.    | Robinson's University Algebra,  | - | - | - | - | - | - |
| XII.   | Robinson's Key to University Algebra,   | - | - | - | - | - | - |
| XIII.  | Robinson's New University Algebra,  | - | - | - | - | - | - |
| XIV.   | Robinson's Key to New University Algebra,   | - | - | - | - | - | - |
| XV.    | Robinson's New Geometry and Trigonometry,   | - | - | - | - | - | - |
| XVI.   | Robinson's Surveying and Navigation,  | - | - | - | - | - | - |
| XVII.  | Robinson's Analyt. Geometry and Conic Sections,   | - | - | - | - | - | - |
| XVIII. | Robinson's Differen. and Int. Calculus, (in preparation),                               | - | - | - | - | - | - |
| XIX.   | Robinson's Elementary Astronomy,  | - | - | - | - | - | - |
| XX.    | Robinson's University Astronomy.  | - | - | - | - | - | - |
| XXI.   | Robinson's Mathematical Operations,   | - | - | - | - | - | - |
| XXII.  | Robinson's Key to Geometry and Trigonometry, Conic<br>Sections and Analytical Geometry, | - | - | - | - | - | - |

---

Entered, according to Act of Congress, in the year 1860 by


DANIEL W. FISH & J. H. FRENCH,

and again in the year 1863, by

DANIEL W. FISH, A.M.,

In the Clerk's Office of the District Court of the United States for the Northern  
District of the New York.

---



## PROMINENT CHARACTERISTICS

OF

## ROBINSON'S MATHEMATICAL SERIES.

---

The books of this Series, although many of them have so recently been published, have been recommended and adopted by hundreds of the most critical and successful teachers, for the following reasons :

1. For the *philosophical* and *scientific* arrangement of the subjects.

2. For the *conciseness* of the rules and the *brevity* and *accuracy* of the definitions.

3. For the *rigid* and *logical*, yet *full* and *comprehensive* Analysis.

4. For the *new*, *original*, and *improved* methods of operations, not found in most other works of the kind.

5. For the very large *number* and *variety* of *practical* examples—practical, because adapted to the ordinary transactions of business life.

6. For their *typographical* execution, *substantial binding*, and general *attractiveness*.

7. For the *easy gradation* and *progressiveness*, not only in the several *books* that compose the series, but in the arrangement and treatment of the *subjects* of each book.

8. For their *adaptation* to the various grades of scholarship in all our schools.

9. For the general *unity* of their plan, and the *clearness* and *perspicuity* of their style.

10. For *scientific accuracy*, combined with *practical utility*, throughout the whole.



THE UNIVERSITY OF CHICAGO  
LIBRARY  
1215 EAST 58TH STREET  
CHICAGO, ILL. 60637

THE UNIVERSITY OF CHICAGO  
LIBRARY  
1215 EAST 58TH STREET  
CHICAGO, ILL. 60637

THE UNIVERSITY OF CHICAGO  
LIBRARY  
1215 EAST 58TH STREET  
CHICAGO, ILL. 60637

THE UNIVERSITY OF CHICAGO  
LIBRARY  
1215 EAST 58TH STREET  
CHICAGO, ILL. 60637

# K E Y .

---

## ADDITION.

(67, page 25.)

Ex. 3. <i>Ans.</i> 1982738.	Ex. 4. <i>Ans.</i> 435058.
Ex. 5. <i>Ans.</i> 3189.	Ex. 6. <i>Ans.</i> 289142.
Ex. 7. <i>Ans.</i> 415184.	Ex. 12. <i>Ans.</i> 3001623.
Ex. 13. <i>Ans.</i> 16977.	Ex. 16. <i>Ans.</i> 1881.
Ex. 17. <i>Ans.</i> 6076510.	Ex. 20. <i>Ans.</i> 21184000
Ex. 22. <i>Ans.</i> \$1924950.	

## ADDING TWO OR MORE COLUMNS AT ONE OPERATION.

(68, page 28.)

Ex. 5. Number of churches,	35887;
“ “ persons accommodated,	13847902;
Value of church property,	\$85774659.
Ex. 6. Pounds of butter,	312625306;
“ “ cheese,	105735893;
“ “ wool,	52516961;
Bushels of wheat,	100485844.

---

## SUBTRACTION.

(75, page 31.)

Ex. 5. <i>Ans.</i> 174333815.	Ex. 6. <i>Ans.</i> 2361650877.
Ex. 7. <i>Ans.</i> 86602389426.	Ex. 8. <i>Ans.</i> 9000989311.

(25-31)

Ex. 10. *Ans.* 86 years.Ex. 13. *Ans.* \$44656513Ex. 15. *Ans.* 2121108 square miles; 316636286 population.Ex. 20. *Ans.* 2657043.

## TWO OR MORE SUBTRAHENDS.

(76, page 34.)

Ex. 5. 4568

1320

275

3202653 *Ans.*Ex. 6.  $4756 + 575 + 140 + 84 = 5555$ 1200

750

963509 *Ans.*

Ex. 7. \$15760

2175

3794

4587\$5204 *Ans.*

Ex. 8. \$75860

45640

25175

\$5045 *Ans.*

Ex. 9. 20000

110007000*Ans.* 2000 square miles.

Ex. 10. 398470

15754814342997493 *Ans.*

Ex. 11. \$61357088

52889800234000\$8233288 *Ans.*Ex. 12.  $\$5760 + \$3575 = \$9335$ 27464632\$1957 *Ans.*

# MULTIPLICATION.

7

Ex. 13. 643166

65038

114624

Ans. 463504

Ex. 14. \$8186793

5700314

904299

\$1582180 Ans.

Ex. 15. \$12722470

7821556

424497

2355016

Ans. \$2121401

# MULTIPLICATION.

(85, page 38.)

Ex. 7. Ans. 43506216.

Ex. 8. Ans. 48288058.

Ex. 16. Ans. 24500.

Ex. 19. Ans. \$31647000

Ex. 20. Ans. \$909000.

# POWERS OF NUMBERS.

(91, page 39.)

Ex. 1.  $72 \times 72 = 5184$ .

Ex. 2.  $12 \times 12 \times 12 \times 12 \times 12 = 248832$ .

Ex. 3.  $25 \times 25 \times 25 = 15625$ .

Ex. 4.  $7 \times 7 \times 7 \times 7 \times 7 \times 7 \times 7 = 823543$ .

Ex. 5.  $19 \times 19 \times 19 \times 19 = 130321$ .

Ex. 6.  $3 \times 3 \times 3 \times 3 \times 3 \times 3 = 729$

Ex. 7. *Ans.*  $9^5=59049$ ;  $11^3=1331$ ;  $18^2=324$ ;  $125^4=244140625$ ;  $786^2=617796$ ;  $94^6=689869781056$ ;  $100^4=100000000$ ;  $17^3=4913$ ;  $251^5=996250626251$ .

Ex. 8.  $8^3=512$ ;  $15^2=225$ ; and  $512 \times 225=115200$ , *Ans.*

Ex. 9.  $25^2=625$ ;  $3^4=81$ ; and  $625 \times 81=50625$ , *Ans.*

Ex. 10.  $7^3 \times 200=68600$ ;  $4^4 \times 11^2=30976$ ; and  $68600-30976=37624$ , *Ans.*

### CONTRACTIONS IN MULTIPLICATION.

(98, page 42.)

Ex. 1.  $736 \times 6 \times 4=17664$ , *Ans.*

Ex. 2.  $538 \times 8 \times 7=30128$ , *Ans.*

Ex. 3.  $27865 \times 7 \times 3 \times 4$ , or  $27865 \times 7 \times 12=2340660$ , *Ans.*

Ex. 4.  $7856 \times 4 \times 4 \times 3 \times 3$ , or  $7856 \times 12 \times 12=1131264$ , *Ans.*

Ex. 5.  $\$185 \times 8 \times 7=\$10360$ , *Ans.*

Ex. 6.  $17740872 \times 8 \times 12=1703123712$  cubic feet, *Ans.*

(99.)

Ex. 3. *Ans.* 50000 dollars.      Ex. 4. *Ans.* 100000000000

(100, page 43.)

Ex. 3. *Ans.* 10350000.      Ex. 5. *Ans.* 192128000

(102, page 44.)

Ex. 1. 5784

246

---

34704

138816

---

1422864 *Ans.*

Ex. 2. 3785

721

---

26495

79485

---

2728985 *Ans.*

(40-44)



Ex. 3. 472856

54918

---

4255704

8511408

---

25534224

---

25968305808 *Ans.*

Ex. 5. 573042

24816

---

4584336

9168672

---

13753008

---

14220610272 *Ans.*

Ex. 7. 43725652

5187914

---

393530868

787061736

306079564

612159128

---

218628260

---

226847922169928 *Ans.*

Ex. 9. 2703605

4249784

---

18925235

132476645

---

113551410

227102820

---

11489737271320 *Ans.*

Ex. 4. 43785

7153

---

131355

656775

---

306495

---

313194105 *Ans*

Ex. 6. 78563721

127369

---

707073489

2828293956

2121220467

---

78563721

---

10006582580049 *Ans*

Ex. 8. 3578426785

64532164

---

14313707140

57254828560

114509657120

17892133925

---

229019314240

---

230923624151612740 *Ans.*

Ex. 10. 9462108

16824

---

75696864

227090592

---

151393728

---

159190504992 *Ans.*

## EXAMPLES COMBINING THE PRECEDING RULES.

(Page 45.)

Ex. 1.  $\$28 \times 175 = \$4900$  ;  $\$37 \times 320 = \$11840$  ;  $\$4900 + \$11840 = \$16740$ , *Ans.*

Ex. 2.  $\$1200 - (\$364 + \$275 + \$150 + \$187) = \$224$ ; and  $\$224 \times 5 = \$1120$ , *Ans.*

Ex. 3.  $29 + 32 = 61$  ;  $61 \times 17 = 1037$  miles, *Ans.*

Ex. 4.  $\$34 \times 127 = \$4318$  ;  $\$47 \times 97 = \$4559$  ; and  $\$4318 + \$4559 = \$8877$ , cost ;  $127 + 97 = 224$  ;  $\$40 \times 224 = \$8960$ , sold for ;  $\$8960 - \$8877 = \$83$ , profit, *Ans.*

Ex. 5.  $77 + 56 = 133$  ;  $675 - 133 = 542$ , multiplicand.  $3 \times 156 = 468$  ;  $214 - 28 = 186$  ;  $468 - 186 = 282$ , multiplier.  $542 \times 282 = 152844$ , *Ans.*

Ex. 6.  $37 + 50 = 87$  ;  $87 \times 6 = 522$  ;  $98 + 522 = 620$ , multiplicand.  $64 - 50 = 14$  ;  $14 \times 5 = 70$  ;  $70 - 10 = 60$ , multiplier.  $620 \times 60 = 37200$ , *Ans.*

Ex. 7.  $14 \times 25 = 350$  ;  $9 \times 36 = 324$  ;  $350 - 324 + 4324 = 4350$ , multiplicand.  $280 - 112 = 168$  ;  $376 + 42 = 418$  ;  $418 \times 4 = 1672$  ;  $168 + 1672 = 1840$ , multiplier.  $4350 \times 1840 = 8004000$ , *Ans.*

Ex. 8.  $\$2751 \times 29967 = \$82439217$

$\$5030 \times 23905 = \$120242150$

---

$\$37802933$  *Ans.*

Ex. 9.  $1449075 \times 203 = 294162225$  acres cultivated ;  $1922890880 - 294162225 = 1628728655$  acres, *Ans*

Ex. 10.  $\$2258 + \$105 = \$2363$ , valuation per farm ;  $\$2363 \times 1449075 = \$3424164225$ , *Ans.*

Ex. 11.  $2^4 \times 5^5 = 50000$  ;  $7^3 = 343$  ;  $50000 - 343 = 49657$ , *Ans.*

Ex. 12.  $15^3=3375$ ;  $3^2 \times 2^5=288$ ;  $208^2=43264$ ;  $9 \times 2^4=144$ .  $3375+43264=46639$ ;  $288+144=432$ ;  $46639-432=46207$ , *Ans.*

Ex. 13.  $4+27+256+3125+46656=50068$ , *Ans.*

Ex. 14.  $1200000 \times 400=480000000$  pounds, *Ans.*

Ex. 15.        -        -        -        \$2450, value of house;

$\$2450 \times 6 - \$500 = 14200$ ,        "        "        farm;

$\$2450 \times 2 = 4900$ ,        "        "        stock;

---

*Ans.* \$21550, total value.

Ex. 16.  $1500 \times \$7 = \$10500$ ;  $800 \times \$10 = \$8000$ ;  $700 \times \$6 = \$4200$ ;  $\$8000 + \$4200 = \$12200$ ;  $\$12200 - \$10500 = \$1700$ , *Ans.*

Ex. 17.  $(\$450 + \$780 + \$1250 + \$2275) \times 3 = \$14265$ , *Ans.*

Ex. 18.  $\$115 \times 35000 = \$4025000$ , *Ans.*

Ex. 19.  $\$485 \times 2500 = \$1212500$

$\$1450 \times 10 = 14500$

$\$1250 \times 25 = 31250$

---

\$1258250 *Ans.*

Ex. 20.  $1401944 \times \$20 = \$28038880$ , value of double eagles;

$62990 \times \$10 = 629900$ ,        "        "        eagles;

$154555 \times \$5 = 772775$ ,        "        "        half eagles;

$22059 \times \$3 = 66177$ ,        "        "        \$3 pieces.

---

*Ans.* \$29507732, total value.

## DIVISION.

(111, page 49.)

Ex. 1.    *Ans.* 78972.

Ex. 2.    *Ans.* 121562.

Ex. 3.    *Ans.* 152329.

Ex. 4.    *Ans.* 6086847.

Ex. 9. *Ans.* 7198.Ex. 10. *Ans.* 7071.Ex. 11. *Ans.* 15607.Ex. 12. *Ans.*  $48340\frac{7}{32}$ .Ex. 13. *Ans.*  $125397\frac{194}{216}$ .Ex. 14. *Ans.*  $5479\frac{5219}{5317}$ .Ex. 15. *Ans.*  $2084768\frac{1255}{2359}$ .Ex. 16. *Ans.*  $2478\frac{100}{291}$ .Ex. 17. *Ans.*  $5851\frac{342}{657}$ .Ex. 18. *Ans.*  $591862\frac{403}{907}$ .Ex. 19. *Ans.*  $15395919\frac{12214}{37149}$ .Ex. 20. *Ans.*  $901\frac{5009}{54001}$ .Ex. 21.  $\$147675 \div 365 = \$404\frac{215}{365}$  *Ans.*Ex. 22.  $\$30732518 \div 556 = \$55274\frac{174}{556}$  *Ans.*Ex. 23.  $\$5572470 \div 287 = \$19416\frac{78}{237}$  *Ans.*Ex. 24.  $\$8186793 \div 27977 = \$292\frac{7509}{27977}$  *Ans.*

## ABBREVIATED LONG DIVISION.

(112 page 51.)

Ex. 1. 204)77112(378 *Ans.*

159

163

Ex. 2. 72)65664(912 *Ans.*

8

14

Ex. 3. 209)7913576(37864 *Ans.*

164

180

133

83

Ex. 4. 698)6636584(9508 *Ans.*

354

55

Ex. 5. 8903)4024156(452 *Ans.*

4629

1780

(49—51)

**Ex. 6.** 6791)760592(112 *Ans.*

814

1358

**Ex. 7.** 25203)101443929(4025<sup>1854</sup><sub>25203</sub> *Ans.*

631

12786

1854

**Ex. 8.** 269181)1246038849(4629 *Ans.*

169314

78062

242262

**Ex. 9.** 56240)2318922(41<sup>18982</sup><sub>56240</sub> *Ans.*

6932

13082

**Ex. 10.** 17300)1454900(84<sup>1700</sup><sub>17300</sub> *Ans.*

7090

1700

## CONTRACTIONS IN DIVISION.

(121 page 57.)

**Ex. 1.** 3(435

5)145

29 *Ans.*

**Ex. 2.** 7)4256

8)608

76 *Ans.*

**Ex. 3.** 9)17856

8)1984

248 *Ans.*

**Ex. 4.** 2)15288

3)7644

7)2548

364 *Ans.*



Ex. 5.  $8)972552$

$$\begin{array}{r} \hline 7)121569 \\ \hline \end{array}$$

$$\begin{array}{r} \hline 3)17367 \\ \hline \end{array}$$

5789 *Ans.*

Ex. 6.  $9)526050$

$$\begin{array}{r} \hline 7)58450 \\ \hline \end{array}$$

$$\begin{array}{r} \hline 2)8350 \\ \hline \end{array}$$

4175 *Ans.*

Ex. 7.  $7)612360$

$$\begin{array}{r} \hline 5)87480 \\ \hline \end{array}$$

$$\begin{array}{r} \hline 3)17496 \\ \hline \end{array}$$

5832 *Ans.*

Ex. 8.  $3)553$

$$\begin{array}{r} \hline 5)184 \text{ - - - - - } 1 \\ \hline \end{array}$$

Quotient,  $36 \text{ - - } 4 \times 3 = 12$

13, remainder.

Ex. 9.  $3)10183$

$$\begin{array}{r} \hline 5)3394 \text{ - - - - - } 1 \\ \hline \end{array}$$

$$\begin{array}{r} \hline 7)678 \text{ - - - } 4 \times 3 = 12 \\ \hline \end{array}$$

Quotient,  $96 \text{ - } 6 \times 5 \times 3 = 90$

103, remainder.

Ex. 10.  $2)10197$

$$\begin{array}{r} \hline 3)5098 \text{ - - - - - } 1 \\ \hline \end{array}$$

$$\begin{array}{r} \hline 4)1699 \text{ - - - - - } 1 \times 2 = 2 \\ \hline \end{array}$$

$$\begin{array}{r} \hline 5)424 \text{ - - - } 3 \times 3 \times 2 = 18 \\ \hline \end{array}$$

Quotient,  $84 \text{ - } 4 \times 4 \times 3 \times 2 = 96$

117, remainder.

**Ex. 11.**  $3)29792$ 

$$\begin{array}{r} \hline 8)9930 \text{ . . . . . } 2 \\ \hline \end{array}$$

$$\begin{array}{r} \hline 6)1241 \text{ . . . . . } 2 \times 3 = 6 \\ \hline \end{array}$$

$$\text{Quotient, } 206 \text{ . . } 5 \times 8 \times 3 = 120$$

---

 128, remainder
**Ex. 12.**  $4)73522$ 

$$\begin{array}{r} \hline 6)18380 \text{ . . . . . } 2 \\ \hline \end{array}$$

$$\begin{array}{r} \hline 7)3063 \text{ . . . . . } 2 \times 4 = 8 \\ \hline \end{array}$$

$$\text{Quotient, } 437 \text{ . . . } 4 \times 6 \times 4 = 96$$

---

 106, remainder
**Ex. 13.**  $3)63844$ 

$$\begin{array}{r} \hline 5)21281 \text{ . . . . . } 1 \\ \hline \end{array}$$

$$\begin{array}{r} \hline 9)4256 \text{ . . . . } 1 \times 3 = 3 \\ \hline \end{array}$$

$$\text{Quotient, } 472 \text{ . . . } 8 \times 5 \times 3 = 120$$

---

 124, remainder.
**Ex. 14.**  $2)386639$ 

$$\begin{array}{r} \hline 3)193319 \text{ . . . . . } 1 \\ \hline \end{array}$$

$$\begin{array}{r} \hline 4)64439 \text{ . . . . . } 2 \times 2 = 4 \\ \hline \end{array}$$

$$\begin{array}{r} \hline 5)16109 \text{ . . . . } 3 \times 3 \times 2 = 18 \\ \hline \end{array}$$

$$\begin{array}{r} \hline 6)3221 \text{ . . } 4 \times 4 \times 3 \times 2 = 96 \\ \hline \end{array}$$

$$\text{Quotient, } 536 \text{ } 5 \times 5 \times 4 \times 3 \times 2 = 600$$

---

 719, remainder

Ex. 15. 4)734514

$$\begin{array}{r} \hline 6)183628 \text{ - - - - - } 2 \\ \hline \end{array}$$

$$\begin{array}{r} \hline 7)30604 \text{ - - - - } 4 \times 4 = 16 \\ \hline \end{array}$$

Quotient, 4372 18, remainder.

Ex. 16. 9)636388

$$\begin{array}{r} \hline 9)70709 \text{ - - - - - } 7 \\ \hline \end{array}$$

$$\begin{array}{r} \hline 9)7856 \text{ - - - - - } 5 \times 9 = 45 \\ \hline \end{array}$$

Quotient, 872 8 \times 9 \times 9 = 648

700, remainder.

Ex. 17. 5)4619

$$\begin{array}{r} \hline 5)923 \text{ - - - - - } 4 \\ \hline \end{array}$$

$$\begin{array}{r} \hline 5)184 \text{ - - - - - } 3 \times 5 = 15 \\ \hline \end{array}$$

Quotient, 36 4 \times 5 \times 5 = 100

119, remainder.

Ex. 18. 3)116423

$$\begin{array}{r} \hline 7)38807 \text{ - - - - - } 2 \\ \hline \end{array}$$

$$\begin{array}{r} \hline 7)5543 \text{ - - - - - } 6 \times 3 = 18 \\ \hline \end{array}$$

$$\begin{array}{r} \hline 8)791 \text{ - - - - - } 6 \times 7 \times 3 = 126 \\ \hline \end{array}$$

$$\begin{array}{r} \hline 9)98 \text{ - - - - - } 7 \times 7 \times 7 \times 3 = 1029 \\ \hline \end{array}$$

Quotient, 10 8 \times 8 \times 7 \times 7 \times 3 = 9408

10583, remaind'r.

Ex. 19.  $5 \overline{)79500}$

$5 \overline{)15900}$

$5 \overline{)3180}$

$7 \overline{)636}$

$7 \overline{)90} - - - - 6 \times 5 \times 5 \times 5 = 750$

Quotient,  $12 - - - - 6 \times 7 \times 5 \times 5 \times 5 = 5250$

6000, remainder.

(122, page 58.)

Ex. 2. Ans.  $79 \frac{82}{100}$ .

Ex. 4. Ans.  $230 \frac{1050}{10000}$ .

(123.)

Ex. 2. Ans.  $27 \frac{372}{500}$ .

Ex. 6. Ans.  $8206 \frac{3400}{1000}$ .

Ex. 7. Ans. 3005.

#### EXAMPLES COMBINING THE PRECEDING RULES.

(Page 59.)

Ex. 1.  $\$4 \times 25 = \$100$ ;  $\$3 \times 36 = \$108$ ;  $\$100 + \$108 =$   
 $\$208$ ;  $208 \div 8 = 26$ , Ans.

Ex. 2.  $\$16 \times 12 = \$192$ ;  $\$13 \times 17 = \$221$ ;  $\$192 + \$221 =$   
 $\$413$ , cost;  $\$18 \times (12 + 17) = \$522$ ;  $\$522 - \$413 =$   
 $\$109$ , Ans.

Ex. 3.  $\$2 \times 300 + \$750 = \$1350$ , value of produce;  
 $\$3 \times 120 + \$90 = \$450$ , " " stock;

$\$900 \div 25 = \$36$ , Ans.

(57-59)

Ex. 4.  $450 + (24 - 12) \times 5 = 510$ ;  
 $(90 \div 6) + (3 \times 11) - 18 = 30$ ;  
 $510 \div 30 = 17$ , *Ans.*

Ex. 5.  $648 \times (3^2 \times 2^3) \div 9 = 5184$ ;  $2910 \div 15 = 194$ ;  $5184 - 194 = 4990$ , dividend;  $4375 \div 175 = 25$ ;  $25 \times 4^2 + 3^2 = 409$ ;  $2863 \div 409 = 7$ , divisor. Hence,  $4990 \div 7 = 712\frac{6}{7}$ , *Ans.*

Ex. 6.  $42 \times 34 = 1428$ ;  $107100 \div 1428 = 75$ , *Ans.*

Ex. 7. Reversing the fifth operation,  $12 \times 24 = 288$ ;  
 reversing the fourth operation,  $288 \div 6 = 48$ ;  
 reversing the third operation,  $48 + (28 - 16) = 60$ ;  
 reversing the second operation,  $60 - (7^2 + 1) = 10$ ;  
 reversing the first operation,  $10 \times 45 = 450$ , *Ans.*

Ex. 8.  $\$60 - \$42 = \$18$ ;  $\$36 \times 50 = \$1800$ ;  
 $1800 \div 18 = 100$  months, *Ans.*

Ex. 9.  $251104 \div 472 = 532$ , *Ans.*

Ex. 10.  $3042^2 = 9253764$ , *Ans.*

Ex. 11.  $453 \times 307 + 109 = 139180$ , *Ans.*

Ex. 12.  $\$4 + \$7 = \$11$ ;  $\$1276 \div \$11 = 116$ , number of each kind;  $116 \times 2 = 232$ , whole number purchased;  
 $\$7 - \$4 = \$3$ ;  $\$3 \times 116 = \$348$ , difference in cost.

Ex. 13.  $\$950 + \$7500 = \$8450$ ;  
 $\$13982686 \div \$8450 = 1654$ , and a remainder of \$6386.

Ex. 14.  $\$54 \times 4300000 \div \$60 = 3870000$  tons, *Ans.*

Ex. 15.  $23191876 \div 400 = 57979\frac{276}{400}$ . Hence, by this estimate, 57979 persons died.

Ex. 16.  $508464 \div 10593 = 48$ , *Ans.*



- Ex. 17.  $\$7680 \div \$64 = 120$ , number sold;  
 $\$960 \div 120 = \$8$ , gained per head;  
 $\$64 - \$8 = \$56$ , cost per head;  
 $\$9800 \div \$56 = 175$ , number bought.
- Ex. 18.  $\$95 \times 6 + \$1200 = \$1770$ ;  $\$1770 \div 30 = \$59$ , *Ans.*
- Ex. 19.  $36 \times 16 = 576$ , number of days' work required;  
 $576 \div 24 = 24$ , number of days 24 men will require.
- Ex. 20.  $\$1650 \div 275 = \$6$ , cost per barrel;  
 $(\$9 - \$6) \times 186 = \$558$ , gain.
- Ex. 21.  $840 \div (5 + 10 + 15) = 28$ , of each kind; hence,  $28 \times 3 = 84$ , whole number.
- Ex. 22.  $\$965 - (\$5 \times 160) = \$165$ ;  $165 \div 3 = 55$  tons, unsold;  
 $160 + 55 = 215$  tons bought.
- Ex. 23.  $\$3825 \div \$85 = 45$ , number sold;  
 $\$7560 \div (\$85 + \$5) = 84$ , whole number of horses;  
 $(\$7560 + \$945) - \$3825 = \$4680$ , to be realized on the remainder.  
Hence,  $\$4680 \div (84 - 45) = \$120$ , *Ans.*
- Ex. 24.  $\$22360 + \$1742 = \$24102$ , total cost;  
 $\$15480 \div \$18 = 860$ ;  $860 \times 2 = 1720$ , No. acres;  
 $\$22360 \div 1720 = \$13$ , original cost per acre.

## PROBLEMS IN SIMPLE INTEGRAL NUMBERS.

(127, page 62.)

The following are the *general solutions*:

- Prob. 1. Add the several numbers.
- Prob. 2. Subtract the sum of the given numbers from the sum of all.
- Prob. 3. Add the parts.
- Prob. 4. Subtract the sum of the given parts from the whole  
(60—63)

- Prob. 5. Subtract the less from the greater.
- Prob. 6. Subtract the difference from the greater.
- Prob. 7. Add the difference to the less.
- Prob. 8. Subtract the subtrahend from the minuend.
- Prob. 9. Subtract the remainder from the minuend.
- Prob. 10. Add the subtrahend and remainder.
- Prob. 11. Multiply the numbers together.
- Prob. 12. Divide the product by the given factor.
- Prob. 13. Divide the continued product by the product of the given factors.
- Prob. 14. Multiply the factors together in continued multiplication.
- Prob. 15. Multiply the multiplicand by the multiplier.
- Prob. 16. Divide the product by the multiplicand.
- Prob. 17. Divide the product by the multiplier.
- Prob. 18. Divide each number by the other.
- Prob. 19. Divide the dividend by the divisor.
- Prob. 20. Multiply the divisor and quotient together.
- Prob. 21. Divide the dividend by the quotient.
- Prob. 22. Multiply the divisor by the quotient, and to the product add the remainder.
- Prob. 23. Subtract the remainder from the dividend, and divide the result by the quotient.
- Prob. 24. Multiply the final quotient and the several divisors together.
- Prob. 25. Divide the first dividend by the continued product of the final quotient into all the given divisors.
- Prob. 26. Divide the dividend by the several divisors successively.
- Prob. 27. Add together the numbers comprising each set, and subtract the less sum from the greater.

- Prob. 28. Multiply together the factors comprising each set, and add the several products.
- Prob. 29. Multiply together the factors comprising each set, and then add the products and given numbers.
- Prob. 30. Multiply together the factors comprising each set, and subtract the less product from the greater.
- Prob. 31. Add the product of the given set or sets of factors and the given number or numbers.
- Prob. 32. Subtract the sum of the products of the set or sets of factors which form the less number from the sum of the products of the set or sets of factors which form the greater number.

## PROPERTIES OF NUMBERS.

## FACTORING.

(142, page 71.)

- Ex. 1.** *Ans.* 2, 5, 5, 43.                      **Ex. 2.** *Ans.* 3, 5, 163.  
                  **Ex. 3.** *Ans.* 2, 2, 3, 3, 5, 5, 7.  
                  **Ex. 4.** *Ans.* 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 3, 7.  
**Ex. 5.** *Ans.* 2, 7, 13, 13.                      **Ex. 6.** 2, 2, 2, 5, 5, 5.  
                  **Ex. 7.** *Ans.* 5, 5, 5, 5, 5, 5, 5, 5.  
                  **Ex. 8.** *Ans.* 3, 3, 3, 7, 11, 13, 37.

(144, page 74.)

- Ex. 2. Ans. 2, 3, 7, 17, 17, 29. Ex. 3. Ans. 13, 17, 31  
Ex. 4. Ans. 17, 19, 29. Ex. 5. Ans. 2, 11, 19, 487.  
Ex. 6. Ans. 7, 83, 103. Ex. 7. Ans. 97, 103.  
Ex. 8. Ans. 3, 5, 59, 139.  
Ex. 9. Ans. 3, 5, 7, 47, 181.

(64-74)

Ex. 10. *Ans.* 2, 2, 2, 2, 2, 2, 41, 149.

Ex. 11. *Ans.* 7, 11, 37, 79.

Ex. 12. *Ans.* 2, 5, 13, 17, 37.

Ex. 13. *Ans.* 13, 17, 29.

Ex. 14. *Ans.* 2, 2, 2, 3, 17, 19, 23.

Ex. 15. *Ans.* 2, 3, 5, 7, 19, 179.

(145, page 76.)

Ex. 1.  $120=1 \times 2 \times 2 \times 2 \times 3 \times 5$

1,	2,	4,	8	Combinations of 1 and 2.
3,	6,	12,	24	" " 1, 2, and 3.
5,	10,	20,	40	" " 1, 2, 3, and 5
15,	30,	60,	120	

*Ans.* 1, 2, 3, 4, 5, 6, 8, 10, 12, 15, 20, 24, 30, 40, 60, 120

Ex. 2.  $84=1 \times 2 \times 2 \times 3 \times 7$

1,	2,	4	Combinations of 1 and 2.
3,	6,	12	" " 1, 2, and 3.
7,	14,	28	" " 1, 2, 3, and 7.
21,	42,	84	

*Ans.* 1, 2, 3, 4, 6, 7, 12, 14, 21, 28, 42, 84.

Ex. 3.  $100=1 \times 2 \times 2 \times 5 \times 5$

1,	2,	4	Combinations of 1 and 2.
5,	10,	20	" " 1, 2, and 5.
25,	50,	100	

*Ans.* 1, 2, 4, 5, 10, 20, 25, 50, 100.

Ex. 4.  $420=1 \times 2 \times 2 \times 3 \times 5 \times 7$

1,	2,	4	Combinations of 1 and 2.
3,	6,	12	" " 1, 2, and 3.
5,	10,	20	" " 1, 2, 3, and 5.
15,	30,	60	
7,	14,	28	" " 1, 2, 3, 5, and 7.
21,	42,	84	
35,	70,	140	
105,	210,	420	

*Ans.* { 1, 2, 3, 4, 5, 6, 7, 10, 12, 14, 15, 20, 21, 28,  
30, 35, 42, 60, 70, 84, 105, 140, 210, 420.

Ex. 5.  $1050=1 \times 2 \times 5 \times 5 \times 3 \times 7$

1, 5, 25 Combinations of 1 and 5.

2, 10, 50 " " 1, 5, and 2.

3, 15, 75 } " " 1, 5, 2, and 3  
6, 30, 150 }

7, 35, 175 }  
14, 70, 350 } " " 1, 5, 2, 3, and 5  
21, 105, 525 }  
42, 210, 1050 }

Ans. { 1, 2, 3, 5, 6, 7, 10, 14, 15, 21, 25, 30, 35, 42,  
50, 70, 75, 105, 150, 175, 210, 350, 525, 1050.

## GREATEST COMMON DIVISOR.

(149, page 77.)

Ex. 2.  $2 \times 3 = 6$ , Ans.

Ex. 5.  $6 \times 7 = 42$ , Ans.

Ex. 8.  $3 \times 3 \times 7 = 63$ , Ans.

Ex. 9. 91, Ans.

Ex. 11.  $4 \times 3 \times 7 = 84$ , Ans.

(150, page 81.)

Ex. 4. Ans. 11.

Ex. 5. Ans. 1.

Ex. 7. Ans. 17.

Ex. 8. Ans. 337

Ex. 10. In the operation under this rule, the quotient figure may always be so taken that the product shall be either greater, or less, than the dividend; in either case, the new divisor will be the *difference* between the dividend and product. It will always be found advantageous to use that quotient figure which will give the least number for a new divisor. In the first operation below, the second quotient figure is 1, and the next divisor is 413690; in the second operation, the second quotient figure is 2, which gives 178593 for the next divisor, and abbreviates the subsequent work

(76—81)



FIRST OPERATION.			SECOND OPERATION.		
1005973	4	4616175 4023892	1005973	4	4616175 4023892
592283	1	592283	1184566	2	592283
413690	1	413690	178593	3	535779
357186	2	178593	169512	3	56504
56504	3	169512	9081	6	54486
54486	6	9081	8072	4	2018
2018	4	8072	Ans. 1009	2	2018
2018	2	1009, Ans.			

Ex. 13. Ans. 47.

Ex. 15. In order that the bins may be equal, the number of bushels contained in one bin must be a *common divisor* of the two quantities. And in order that the number of bins may be the least possible, each must contain the *greatest common divisor* of the two quantities. Ans. 91 bushels.

Ex. 16. The pannels, to be of uniform length, must be a common measure or divisor of the three sides; and to be of the greatest possible length, they must be the greatest common divisor of the three sides. Ans. 11 feet.

Ex. 17. The price to be paid by each is the greatest common divisor of the three sums, \$620, \$1116, and \$1488, which is \$124. Hence, B can purchase  $\$620 \div \$124 = 5$ ; C can purchase  $\$1116 \div \$124 = 9$ ; and D can purchase  $\$1488 \div \$124 = 12$ .

Ex. 18. The greatest common divisor of 14599 feet and 10361 feet is 13 feet, the length of 1 joint in the fence.  $(14599 + 10361) \times 2 = 49920$  feet, the entire length of the



fence.  $49920 \div 13 = 3840$ , the number of joints in the fence; and  $3840 \times 7 = 26880$ , the number of rails, *Ans.*

LEAST COMMON MULTIPLE.

(155, page 83.)

Ex. 1.  $2 \times 2 \times 3 \times 11 \times 7 \times 5 = 4620$ , *Ans.*

Ex. 2.  $7 \times 3 \times 3 \times 2 \times 2 \times 11 \times 5 = 13860$ , *Ans.*

Ex. 3.  $5 \times 3 \times 2 \times 2 \times 2 = 120$ , *Ans.*

Ex. 4.  $7 \times 5 \times 3 \times 2 \times 2 \times 2 \times 2 = 1680$ , *Ans.*

Ex. 5.  $7 \times 5 \times 5 \times 3 = 525$ , *Ans.*

Ex. 6.  $19 \times 3 \times 7 \times 2 = 798$ , *Ans.*

Ex. 7.  $2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 5 = 2880$ , *Ans.*

(156, page 85.)

Ex. 1.	5, 3, 2	15..18..21..24..35..36..42..50..60
	2, 2, 3, 7, 5	3.. 7.. 4.. 7.. 6.. 7.. 5.. 2

---

$5 \times 3 \times 2 \times 2 \times 2 \times 3 \times 7 \times 5 = 12600$ , *Ans.*

Ex. 2.	2, 2, 3	6..8..10..15..18..20..24
	2, 3, 5	2.. 5.. 5.. 3.. 5.. 2

---

$2 \times 2 \times 3 \times 2 \times 3 \times 5 = 360$ , *Ans.*

Ex. 3.	3, 5, 2	9..15..25..35..45..100
	3, 5, 7, 2	3..      5.. 7.. 3.. 10

---

$3 \times 5 \times 2 \times 3 \times 5 \times 7 \times 2 = 6300$ , *Ans.*

Ex. 4.	3, 3, 2	18..27..36..40
	2, 2, 5, 3	3.. 2..20

---

$3 \times 3 \times 2 \times 2 \times 2 \times 5 \times 3 = 1080$ , *Ans.*

(83—85)

Ex. 5.     2, 3 | 12..26..52  
           2, 13 | 2..13..26  


---

 $2 \times 2 \times 3 \times 13 = 156, \text{ Ans.}$

Ex. 6.     2, 2, 17 | 32..34..36  
              8, 9 | 8..        9  


---

 $2 \times 2 \times 17 \times 8 \times 9 = 4896, \text{ Ans.}$

NOTE.—When numbers are prime to each other, as 8 and 9 in the above operation, their product will be their least common multiple.

Ex. 7.     2, 2, 3 | 8..12..18..24..27..36  
              2, 3, 3 | 2..        3.. 2.. 9.. 3  


---

 $2 \times 2 \times 2 \times 3 \times 3 \times 3 = 216, \text{ Ans.}$

Ex. 8.     2, 11 | 22..33..44..55..66  
              2, 3, 5 | 3.. 2.. 5.. 3  


---

 $2 \times 11 \times 2 \times 3 \times 5 = 660, \text{ Ans.}$

NOTE.—The first three numbers in Ex. 7 and the first two in Ex. 8, above, are factors of remaining numbers in the examples respectively. They might, therefore, have been omitted in the operations.

Ex. 9.     2, 2, 3 | 64..84..96..216  
              2, 2, 2, 2 | 16.. 7.. 8.. 18  
              3, 3, 7 | 7        9  


---

 $2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 7 = 12096, \text{ Ans.}$

Ex. 10. The number of rods that will furnish *whole* days' work to each one, must be some common multiple of 14, 25, 8 and 20; and the *least* number of rods that will furnish

whole days' work to each of the men, must therefore be the least common multiple of 14, 25, 8 and 20.

*Ans.* 1400 rods.

Ex. 11. The least common multiple of the prices, \$4, \$21, \$49, and \$72, which is \$3528, *Ans.*

Ex. 12. When all the men work together, they will dig  $4+8+6=18$  rods per day. The ditch must therefore be the least common multiple of 4 rods, 8 rods, 6 rods, and 18 rods, which is 72 rods, *Ans.*

Ex. 13. The least common multiple of 11 feet and 15 feet is  $15 \times 11 = 165$  feet, the distance the carriage must move to bring the rivets up together. Hence,  $165 \times 575 = 94875$  feet, the entire distance traveled; and  $94875 \text{ feet} \div 5280 = 17 \text{ miles } 5115 \text{ feet}$ , *Ans.*

CANCELLATION.

(159, page 87.)

$$\text{Ex. 2. } \frac{21 \times 8 \times 66^5 \times 7 \times 6^2}{7 \times 12 \times 3 \times 7 \times 3} = 80, \text{ Ans.}$$

$$\text{Ex. 3. } \frac{16 \times 5 \times 14^2 \times 46 \times 16 \times 66 \times 56}{46 \times 24 \times 56 \times 26 \times 7 \times 16} = 32, \text{ Ans.}$$

$$\text{Ex. 4. } \frac{61}{3 \times 14 \times 6 \times 5 \times 26 \times 6} = 61, \text{ Ans.}$$

(86-88)



# FRACTIONS.

## NOTATION AND NUMERATION.

(169, page 90.)

Ex. 3. Ans.  $\frac{16}{48}$ .

Ex. 4. Ans.  $\frac{95}{179}$ .

Ex. 5. Ans.  $\frac{536}{400}$ .

Ex. 6. Ans.  $\frac{1857}{9521}$ .

Ex. 7. Ans.  $2\frac{5000}{87}$ .

Ex. 8. Ans.  $\frac{30}{10082}$ .

Ex. 9. Ans.  $\frac{101}{10000000}$ .

Ex. 10. Four *ninths*; seven *twelfths*; seventeen *thirty eighths*; forty-five *one hundredths*; seventy-two *three hundred seventy-fifths*; forty-eight *one thousand ninths*; eighty-four *seven thousand eight hundred sixty-thirds*; four hundred fifty-six *five hundred thirty-sevenths*.

Ex. 11. Twenty *fourths*; eighty-seven *thirtieths*; ninety-five *one hundredths*; forty-eight *twelfths*; seventy-five *four hundred thirty-sevenths*; one hundred seventy-five *halves*; four hundred thirty-six *fiftieths*; seven hundred sixty-six *four thousand eight hundred seventy-ninths*.

Ex. 12. Four hundred sixty-seven *nine hundred thirty-sixths*; five hundred thirty-six *two hundred forty-eighths*; ten thousand *seventy-fifths*; seventy-five *ten thousandths*; five thousand seven *three thousand sevenths*.

Ex. 13. One hundred fifty *five hundred thirty-sevenths*; four hundred thirty-six *nine hundred seventy seconds*; thirteen thousand seven hundred eighty-five *forty-seven thousand nine hundred fifty-sixths*; one hundred fifty thousand seventy-two *four hundred seventy-five thousandths*; one hundred thousand one *two hundred thousand seconds*.

(90, 91)



## REDUCTION.

(177, page 92.)

Ex. 6.  $\frac{595}{668} = \frac{17}{19}, \text{ Ans.}$

Ex. 7.  $\frac{258}{282} = \frac{43}{47}, \text{ Ans.}$

Ex. 8.  $\frac{639}{1737} = \frac{71}{193}, \text{ Ans.}$

Ex. 9.  $\frac{522}{7042} = \frac{373}{503}, \text{ Ans.}$

Ex. 13.  $\frac{4489}{5561} = \frac{67}{83}, \text{ Ans.}$

Ex. 15.  $\text{Ans. } \frac{1009}{1523}, \frac{23583}{23209}.$

(178, page 93.)

Ex. 2.  $\frac{56}{4} = 14, \text{ Ans.}$

Ex. 7.  $\frac{2431}{85} = 28\frac{51}{5} = 28\frac{3}{5}, \text{ Ans.}$

Ex. 9.  $\frac{3802}{15} = 253\frac{7}{15}, \text{ Ans.}$

Ex. 12.  $\frac{10302}{10201} = 1\frac{101}{10201} = 1\frac{1}{101}, \text{ Ans.}$

(179, page 94.)

Ex. 2.  $375 = 300, \text{ Ans.}$

Ex. 3.  $478 = 1\frac{1472}{24}, \text{ Ans.}$

Ex. 4.  $36 = 3\frac{2}{3}, \text{ Ans.}$

(180, page 95.)

Ex. 3.  $57\frac{5}{7} = 49\frac{4}{7}, \text{ Ans.}$

Ex. 5.  $872\frac{5}{12} = 1046\frac{9}{12}, \text{ Ans.}$

Ex. 8.  $15\frac{7}{8} = 12\frac{7}{8}, \text{ Ans.}$

Ex. 10.  $43\frac{3}{4} = 17\frac{5}{4}, \text{ Ans.}$

Ex. 11.  $760\frac{9}{10} = 760\frac{9}{10}, \text{ Ans.}$

(181, page 96.)

Ex. 1.  $24 \div 3 = 8;$

Ex. 2.  $96 \div 12 = 8;$

$\frac{2}{3} = \frac{16}{24}, \text{ Ans.}$

$\frac{7}{12} = \frac{56}{96}, \text{ Ans.}$

Ex. 3.  $51 \div 17 = 3;$

Ex. 4.  $78 \div 13 = 6;$

$\frac{12}{17} = \frac{36}{51}, \text{ Ans.}$

$\frac{9}{13} = \frac{54}{78}, \text{ Ans.}$

Ex. 5.  $3000 \div 375 = 8;$

Ex. 6.  $8 \div 4 = 2;$

$\frac{62}{375} = \frac{496}{3000}, \text{ Ans.}$

$7\frac{3}{4} = 3\frac{1}{4} = \frac{62}{8}, \text{ Ans.}$

Ex. 7.  $16\frac{7}{8} = 16\frac{1}{4} = \frac{65}{4};$

$176 \div 4 = 44; \frac{65}{4} = \frac{2860}{176}, \text{ Ans.}$

Ex. 8.  $363 \div 11 = 33;$

$\frac{53}{11} = \frac{58}{11} = \frac{1914}{363}, \text{ Ans.}$

Ex. 9.  $42 \div 7 = 6; 36\frac{7}{7} = 25\frac{7}{7} = \frac{1542}{42}, \text{ Ans.}$

(92-96)



(182, page 96.)

Ex. 2.  $\frac{2}{7}, \frac{5}{9} = \frac{18}{63}, \frac{35}{63}, \text{Ans.}$

Ex. 6.  $\frac{1}{3}, \frac{1}{7}, \frac{1}{11} = \frac{77}{231}, \frac{33}{231}, \frac{21}{231}, \text{Ans.}$

(184, page 98.)

Ex. 1.  $2 \times 2 \times 2 \times 5 = 40$ , least common denominator;  
 $\frac{5}{8}, \frac{3}{10} = \frac{25}{40}, \frac{12}{40}, \text{Ans.}$

Ex. 2.  $3 \times 2 \times 2 = 12$ , least common denominator;  
 $\frac{2}{3}, \frac{3}{4}, \frac{5}{6} = \frac{8}{12}, \frac{9}{12}, \frac{10}{12}, \text{Ans.}$

Ex. 3.  $5 \times 3 \times 2 \times 2 = 60$ , least common denominator,  
 $\frac{3}{5}, \frac{7}{12}, \frac{11}{15} = \frac{36}{60}, \frac{35}{60}, \frac{44}{60}, \text{Ans.}$

Ex. 4.  $2 \times 2 \times 2 \times 3 \times 3 = 72$ , least common denominator;  
 $\frac{2}{3}, \frac{8}{9}, \frac{3}{8} = \frac{48}{72}, \frac{64}{72}, \frac{27}{72}, \text{Ans.}$

Ex. 5.  $\frac{6}{14} = \frac{3}{7}; \frac{10}{24} = \frac{5}{12};$   

$$\begin{array}{r|l} 7, 2 & 7 \dots 12 \dots 42 \\ \hline 2, 3 & 6 \dots 3 \end{array}$$

$7 \times 2 \times 2 \times 3 = 84$ , least common denominator.

$\frac{3}{7}, \frac{5}{12}, \frac{13}{42} = \frac{36}{84}, \frac{35}{84}, \frac{26}{84}, \text{Ans.}$

Ex. 6.  $13 \times 3 \times 2 = 78$ , least common denominator;

$\frac{2}{3}, \frac{4}{13}, \frac{25}{26}, \frac{4}{39} = \frac{52}{78}, \frac{24}{78}, \frac{75}{78}, \frac{8}{78}, \text{Ans.}$

Ex. 7.  $5 \times 3 \times 2 \times 2 \times 2 = 120$ , least common denominator;

$\frac{13}{5}, \frac{7}{15}, \frac{5}{24}, \frac{37}{60} = \frac{312}{120}, \frac{56}{120}, \frac{25}{120}, \frac{74}{120}, \text{Ans.}$

Ex. 8.  $\frac{51}{84} = \frac{17}{28}; 7 \times 2 \times 2 \times 2 \times 3 = 168$ , least com. denom.;

$\frac{20}{21}, \frac{9}{56}, \frac{17}{28} = \frac{160}{168}, \frac{27}{168}, \frac{102}{168}, \text{Ans.}$

Ex. 9.  $\frac{25}{40} = \frac{5}{8}; \frac{25}{120} = \frac{5}{24}; \frac{14}{64} = \frac{7}{32};$

$$\begin{array}{r|l} 2, 2, 3 & 8 \dots 24 \dots 32 \\ \hline 2, 2, 2 & 2 \dots 2 \dots 8 \end{array}$$

$3 \times 2^5 = 96$ , least common denominator;

$\frac{5}{8}, \frac{5}{24}, \frac{7}{32} = \frac{60}{96}, \frac{20}{96}, \frac{21}{96}, \text{Ans.}$

(96-98)

- Ex. 10.  $\frac{38}{247} = \frac{2}{13}$ ;  $\frac{77}{119} = \frac{11}{17}$ ;  $\frac{120}{442} = \frac{60}{221}$ ;  
 $13 \times 17 = 221$ , least common denominator;  
 $\frac{2}{13}, \frac{11}{17}, \frac{60}{221} = \frac{34}{221}, \frac{143}{221}, \frac{60}{221}$ , *Ans.*
- Ex. 11.  $\frac{161}{529} = \frac{7}{23}$ ;  $\frac{289}{391} = \frac{17}{23}$ ;  $\frac{1147}{1961} = \frac{31}{61}$ ;  
 $53 \times 23 = 1219$ , least common denominator;  
 $\frac{7}{23}, \frac{17}{23}, \frac{31}{61} = \frac{371}{1219}, \frac{901}{1219}, \frac{713}{1219}$ , *Ans.*
- Ex. 12.  $7 \times 5 \times 2 = 70$ , least common denominator;  
 $\frac{19}{7}, \frac{3}{14}, \frac{17}{10} = \frac{190}{70}, \frac{15}{70}, \frac{119}{70}$ , *Ans.*
- Ex. 13.  $\frac{931}{1829} = \frac{133 \times 7}{59 \times 31}$ ;  $\frac{3127}{5723} = \frac{53}{97}$ ;  $\frac{5133}{5628} = \frac{59 \times 3}{97 \times 2} = \frac{177}{194}$ ;  
 $97 \times 59 \times 31 \times 2 = 354826$ , least com. denom.;  
 $\frac{931}{1829}, \frac{53}{97}, \frac{177}{194} = \frac{180614}{354826}, \frac{193874}{354826}, \frac{323733}{354826}$ , *Ans.*
- Ex. 14.  $2^3 \times 3^3 \times 5 \times 7 = 7560$ , least com. denom.;  
 $\frac{5}{7}, \frac{11}{12}, \frac{2}{15}, \frac{8}{27}, \frac{9}{35}, \frac{17}{40} =$   
 $\frac{5400}{7560}, \frac{6930}{7560}, \frac{1008}{7560}, \frac{2240}{7560}, \frac{1944}{7560}, \frac{3213}{7560}$ , *Ans.*
- Ex. 15.  $13 \times 7 \times 2 \times 2 = 364$ , least com. denom.;  
 $\frac{4}{7}, \frac{3}{13}, \frac{5}{28}, \frac{7}{52}, \frac{15}{182} = \frac{208}{364}, \frac{84}{364}, \frac{65}{364}, \frac{49}{364}, \frac{30}{364}$ , *Ans.*
- Ex. 16.  $\frac{5}{75} = \frac{1}{15}$ ;  $\frac{32}{56} = \frac{4}{7}$ ;  
 $5 \times 3 \times 7 = 105$ , least com. denom.;  
 $\frac{4}{15}, \frac{1}{15}, \frac{4}{7}, \frac{13}{3} = \frac{28}{105}, \frac{7}{105}, \frac{60}{105}, \frac{455}{105}$ , *Ans.*

### ADDITION.

(186, page 100.)

- Ex. 1.  $\frac{7+4+5+11}{12} = \frac{27}{12} = 2\frac{3}{12} = 2\frac{1}{4}$ , *Ans.*
- Ex. 2.  $\frac{13+4+2+8}{15} = \frac{27}{15} = 1\frac{4}{5}$ , *Ans.*
- Ex. 3.  $\frac{5+8+16+19}{21} = \frac{48}{21} = 2\frac{2}{7}$ , *Ans.*
- Ex. 4.  $7+8+2+5+4 = 26$   
 $\frac{11}{36} + \frac{23}{36} + \frac{17}{36} + \frac{19}{36} + \frac{29}{36} = 2\frac{3}{4}$

28 $\frac{3}{4}$ , *Ans.*

(98-100)

$$\text{Ex. 5. } 37+12+13 = 62$$

$$\frac{9}{56} + \frac{27}{56} + \frac{37}{56} + \frac{53}{56} = 2\frac{1}{4}$$

64\frac{1}{4}, Ans.

$$\text{Ex. 6. } \frac{2}{3} + \frac{3}{4} + \frac{5}{6} + = \frac{8+9+10}{12} = \frac{27}{12} = 2\frac{1}{4}, \text{ Ans.}$$

$$\text{Ex. 7. } \frac{3}{5} + \frac{4}{7} + \frac{13}{21} + \frac{7}{15} = \frac{63+60+65+42}{105} = \frac{237}{105} = 2\frac{9}{35}, \text{ Ans.}$$

$$\text{Ex. 8. } \frac{1}{3} + \frac{2}{9} + \frac{1}{15} = \frac{15+10+3}{45} = \frac{28}{45}, \text{ Ans.}$$

$$\text{Ex. 9. } \frac{5}{12} + \frac{13}{15} + \frac{7}{20} = \frac{25+52+21}{60} = 1\frac{19}{30}, \text{ Ans.}$$

$$\text{Ex. 10. } \frac{1}{3} + \frac{3}{4} + \frac{11}{12} + \frac{29}{42} = \frac{28+63+77+58}{84} = \frac{226}{84} = 2\frac{29}{42}, \text{ Ans.}$$

$$\text{Ex. 11. } \frac{7}{8} + \frac{11}{12} + \frac{17}{18} + \frac{23}{24} + \frac{26}{27} =$$

$$\frac{189+198+204+207+208}{216} = \frac{1006}{216} = 4\frac{71}{108}, \text{ Ans.}$$

$$\text{Ex. 12. } 3+4+2 = 9$$

$$\frac{1}{2} + \frac{2}{3} + \frac{2}{15} = 1\frac{3}{10}$$

10\frac{3}{10}, Ans.

$$\text{Ex. 13. } 16+24=40$$

$$\frac{1}{12} + \frac{1}{18} = \frac{5}{36}$$

40\frac{5}{36}, Ans.

$$\text{Ex. 14. } 1+2+3+4+5=15$$

$$\frac{1}{2} + \frac{2}{3} + \frac{3}{4} + \frac{4}{5} + \frac{5}{6} = 3\frac{11}{20}$$

18\frac{11}{20}, Ans.

$$\text{Ex. 15. } 4+8+2 = 14$$

$$\frac{7}{15} + \frac{5}{21} + \frac{8}{35} = \frac{14}{15}$$

14\frac{14}{15}, Ans.

$$\text{Ex. 16. } \frac{1}{3} + \frac{1}{4} + \frac{1}{12} + \frac{1}{17} = \frac{68+51+17+12}{204} = \frac{37}{51}, \text{ Ans}$$

$$\text{Ex. 17. } \frac{1}{2} + \frac{2}{3} + \frac{2}{13} + \frac{5}{17} = \frac{663+884+204+390}{1326} = 1\frac{85}{1326}, \text{ Ans}$$

$$\text{Ex. 18. } \frac{1}{2} + \frac{2}{9} + \frac{3}{11} + \frac{7}{18} + \frac{17}{33} =$$

$$\frac{99+44+54+77+102}{198} = 1\frac{89}{99}, \text{ Ans}$$

$$\text{Ex. 19. } \frac{1}{2} + \frac{5}{14} + \frac{8}{19} + \frac{2}{3} =$$

$$\frac{399+285+336+532}{798} = \frac{1552}{798} = 1\frac{377}{399}, \text{ Ans}$$

Ex. 20.  $41+105+300+241+472=1159$

$$\frac{1}{2} + \frac{2}{9} + \frac{3}{4} + \frac{3}{5} + \frac{1}{4} = \frac{229}{90}$$


---

1161 $\frac{29}{90}$ , *Ans.*

Ex. 21.  $4+2+1+2+5+7+4+6=31$

$$\frac{1}{8} + \frac{1}{4} + \frac{1}{16} + \frac{5}{24} + \frac{7}{16} + \frac{2}{3} + \frac{1}{2} + \frac{5}{6} = 3\frac{1}{12}$$


---

34 $\frac{1}{12}$ , *Ans.*

Ex. 22.  $36+42+39+51=168$

$$\frac{5}{8} + \frac{2}{3} + \frac{7}{16} + \frac{1}{4} = 1\frac{47}{8}$$


---

169 $\frac{47}{8}$  pounds, *Ans.*

Ex. 23.  $4+3=7$

$$\frac{4}{5} + \frac{22}{35} = 1\frac{3}{7}$$


---

8 $\frac{3}{7}$ , *Ans.*

Ex. 24.  $\frac{5}{18} + \frac{5}{54} = \frac{15+5}{54} = \frac{20}{27}$ , *Ans.*

Ex. 25.  $\frac{1}{8} + \frac{1}{6} + \frac{1}{6} + \frac{2}{15} = \frac{75}{120} = \frac{5}{8}$  of a dollar, *Ans.*

Ex. 26.  $46+64+76=186$

$$\frac{4}{9} + \frac{11}{27} + \frac{5}{6} = 1\frac{37}{54}$$


---

187 $\frac{37}{54}$  yards;

$$\$127 + \$226 + \$312 = \$665$$

$$\$7\frac{7}{8} + \$5\frac{5}{6} + \$2\frac{2}{3} = 11\frac{15}{8}$$


---

\$666 $\frac{15}{8}$ , received for the whole

# SUBTRACTION.

(188, page 102.)

Ex. 1.  $\frac{7-3}{15} = \frac{4}{15}$ , *Ans.*

Ex. 2.  $\frac{35-21}{56} = \frac{14}{56} = \frac{1}{4}$ , *Ans.*

Ex. 3.  $\frac{35-2}{52} = \frac{26}{52} = \frac{1}{2}$ , *Ans.*

(100-102)

$$\text{Ex. 4. } \frac{5}{6} - \frac{3}{8} = \frac{20-9}{24} = \frac{11}{24}, \text{ Ans.}$$

$$\text{Ex. 5. } \frac{3}{4} - \frac{7}{20} = \frac{15-7}{20} = \frac{8}{20} = \frac{2}{5}, \text{ Ans.}$$

$$\text{Ex. 6. } \frac{13}{15} - \frac{7}{24} = \frac{104-35}{120} = \frac{69}{120} = \frac{23}{40}, \text{ Ans.}$$

$$\text{Ex. 7. } \frac{9}{14} - \frac{16}{63} = \frac{81-32}{126} = \frac{49}{126} = \frac{7}{18}, \text{ Ans.}$$

$$\text{Ex. 8. } \frac{14}{39} - \frac{19}{65} = \frac{70-57}{195} = \frac{13}{195} = \frac{1}{15}, \text{ Ans.}$$

$$\text{Ex. 9. } \frac{5}{21} - \frac{1}{15} = \frac{25-7}{105} = \frac{18}{105} = \frac{6}{35}, \text{ Ans.}$$

$$\text{Ex. 10. } \frac{7}{12} - \frac{5}{42} = \frac{49-10}{84} = \frac{39}{84} = \frac{13}{28}, \text{ Ans.}$$

$$\text{Ex. 11. } \frac{7}{64} - \frac{13}{120} = \frac{105-104}{960} = \frac{1}{960}, \text{ Ans.}$$

$$\text{Ex. 12. } \frac{9}{35} - \frac{7}{30} = \frac{54-49}{210} = \frac{5}{210} = \frac{1}{42}, \text{ Ans}$$

$$\text{Ex. 13. } 16\frac{5}{6}$$

$$\text{Ex. 14. } 36\frac{11}{24}$$

$$\underline{7\frac{1}{6}}$$

$$\underline{8\frac{19}{24}}$$

$$9\frac{4}{6} = 9\frac{2}{3}, \text{ Ans.}$$

$$27\frac{16}{24} = 27\frac{2}{3}, \text{ Ans.}$$

$$\text{Ex. 15. } 25\frac{7}{10} = 25\frac{21}{30}$$

$$\text{Ex. 16. } 75$$

$$\underline{14\frac{13}{15}} = 14\frac{26}{30}$$

$$\underline{4\frac{3}{4}}$$

$$10\frac{25}{30} = 10\frac{5}{6}, \text{ Ans.}$$

$$70\frac{4}{7}, \text{ Ans.}$$

$$\text{Ex. 17. } 18\frac{2}{9} = 18\frac{4}{18}$$

$$\text{Ex. 18. } 26\frac{7}{24} = 26\frac{35}{120}$$

$$\underline{5\frac{5}{6}} = 5\frac{15}{18}$$

$$\underline{25\frac{13}{15}} = 25\frac{104}{120}$$

$$12\frac{7}{18}, \text{ Ans.}$$

$$\underline{\frac{51}{120}} = 17, \text{ Ans}$$

$$\text{Ex. 19. } 28\frac{16}{63} = 28\frac{32}{126}$$

$$\underline{3\frac{9}{14}} = 3\frac{81}{126}$$

$$24\frac{77}{126} = 24\frac{11}{18}, \text{ Ans.}$$

$$\text{Ex. 20. } 78\frac{7}{15} = 78\frac{7}{15}$$

$$\underline{32\frac{2}{3}} = 32\frac{10}{15}$$

$$45\frac{12}{15} = 45\frac{4}{5}, \text{ Ans.}$$

$$\text{Ex. 21. } 36\frac{1}{4} - 7\frac{1}{3} = 19\frac{2}{3}, \text{ Ans.}$$

$$\text{Ex. 22. } 97\frac{8}{9} - 18\frac{4}{7} = 79\frac{20}{63}, \text{ Ans.}$$

$$\text{Ex. 23. } 126\frac{1}{7} + 240\frac{3}{4} = 366\frac{25}{28};$$

$$560\frac{5}{8} - 366\frac{25}{28} = 193\frac{41}{56}, \text{ Ans}$$



Ex. 24.  $\frac{1}{8} + \frac{1}{12} + \frac{1}{18} = \frac{19}{72}$ ;  $\frac{25}{36} - \frac{19}{72} = \frac{31}{72}$ , *Ans.*

Ex. 25.  $\frac{8}{9} - \frac{2}{5} = \frac{22}{45}$ , *Ans.*

Ex. 26.  $31\frac{1}{2} - 14\frac{7}{8} = 16\frac{5}{8}$  gallons, *Ans.*

Ex. 27.  $\$140\frac{3}{8}$   
 $456\frac{2}{3}$

$\$775\frac{1}{3}$   
 $516\frac{3}{16}$

$\$597\frac{1}{24}$ , bought for;  $\$1291\frac{25}{48}$ , sold for;

$\$1291\frac{25}{48} - \$597\frac{1}{24} = \$694\frac{23}{48}$ , *Ans*

### MULTIPLICATION.

(193, page 105.)

Ex. 1.  $\frac{3}{9} \times \frac{8}{1} = \frac{8}{3} = 2\frac{2}{3}$ , *Ans.*

Ex. 2.  $\frac{4}{9} \times \frac{27}{1} = 12$ ;  $\frac{3}{16} \times \frac{4}{1} = \frac{3}{4}$ ;  $\frac{5}{36} \times \frac{9}{1} = \frac{5}{4} = 1\frac{1}{4}$ .

Ex. 3.  $\frac{2}{75} \times \frac{15}{1} = \frac{2}{5}$ , *Ans.*

Ex. 4.  $\frac{8}{1} \times \frac{3}{4} = 6$ , *Ans.*

Ex. 5.  $\frac{75}{1} \times \frac{3}{15} = 15$ ;  $\frac{7}{1} \times \frac{8}{21} = \frac{8}{3} = 2\frac{2}{3}$ ;  $\frac{756}{1} \times \frac{5}{6} = 630$ ;  $\frac{572}{1} \times \frac{5}{24} = 119\frac{1}{6}$ .

Ex. 6.  $\frac{3}{7} \times \frac{5}{6} = \frac{5}{14}$ , *Ans.*

Ex. 7.  $\frac{11}{15} \times \frac{20}{33} = \frac{4}{3}$ ;  $\frac{15}{17} \times \frac{51}{75} = \frac{3}{5}$ .

Ex. 8.  $\frac{7}{12} \times \frac{17}{42} = \frac{17}{72}$ ;  $\frac{8}{35} \times \frac{21}{20} = \frac{6}{25}$ .

Ex. 9.  $\frac{18}{7} \times \frac{35}{9} = 10$ , *Ans.*

Ex. 10.  $\frac{9}{7} \times \frac{35}{18} = \frac{5}{2} = 2\frac{1}{2}$ , *Ans.*

Ex. 11.  $\frac{9}{17} \times \frac{85}{36} = \frac{5}{4} = 1\frac{1}{4}$ , *Ans.*

Ex. 12.  $\frac{2}{3} \times \frac{5}{6} \times \frac{9}{15} \times \frac{7}{8} = \frac{7}{24}$ , *Ans.*

Ex. 13.  $\frac{2}{3} \times \frac{7}{8} \times \frac{15}{28} \times \frac{4}{11} \times \frac{44}{75} = \frac{1}{15}$ , *Ans.*

Ex. 14.  $\frac{34}{5} \times \frac{7}{53} \times \frac{106}{119} = \frac{4}{35}$ , *Ans.*

Ex. 15.  $\frac{12}{5} \times \frac{18}{7} \times \frac{2}{11} \times \frac{5}{108} \times \frac{22}{15} \times \frac{105}{4} = 2$ , *Ans.*

Ex. 16.  $\frac{7}{11} \times \frac{5}{21} \times \frac{22}{5} \times \frac{15}{1} \times \frac{2}{16} = 1\frac{5}{8}$ , *Ans.*

Ex. 17.  $\frac{43}{126} \times \frac{7}{860} \times \frac{540}{53} = \frac{3}{106}$ , *Ans.*

Ex. 18.  $4\frac{1}{2} \times \frac{8}{7} = 3\frac{15}{16}$ ;  $3\frac{15}{16} \times 1\frac{3}{5} = 5\frac{43}{80}$ ;  $3\frac{1}{3} - \frac{9}{10} = 2\frac{13}{30}$ ;

$5\frac{43}{80} \times 2\frac{13}{30} = \frac{32339}{2400} = 13\frac{1139}{2400}$ , *Ans.*



Ex. 19.  $7\frac{3}{4} - 2\frac{2}{5} = 5\frac{7}{20}$ ;  $\frac{4}{5} + \frac{1}{3} = 1\frac{2}{15}$ ;  
 $5\frac{7}{20} \times \frac{5}{8} \times 1\frac{2}{15} = 5\frac{19}{80}$ ;  $5\frac{19}{80} + 28 = 33\frac{19}{80}$ ; *Ans.*

Ex. 20.  $\frac{1}{3} \times \frac{4}{5} \times \frac{5}{6} = \frac{2}{9}$ , *Ans.*      Ex. 21.  $\frac{2}{3} \times \frac{7}{8} \times \frac{3}{21} = \frac{1}{12}$ , *Ans.*

Ex. 22.  $\frac{5}{8} \times \frac{4}{15} \times \frac{6}{7} = \frac{1}{7}$ , *Ans.*

Ex. 23.  $\frac{1}{12} \times \frac{5}{33} \times \frac{18}{55} \times \frac{21}{28} = \frac{3}{56}$ , *Ans.*

Ex. 24.  $\frac{1}{2} \times \frac{2}{3} \times \frac{3}{4} \times \frac{4}{5} \times \frac{5}{6} \times \frac{6}{7} \times \frac{7}{8} \times \frac{8}{9} \times \frac{9}{10} = \frac{1}{10}$ , *Ans.*

Ex. 25.  $\frac{901}{713} = \frac{53 \times 17}{71 \times 23}$ ;  $\frac{1219}{1343} = \frac{53 \times 23}{70 \times 17}$ ;  $\frac{2449}{5353} = \frac{79 \times 31}{101 \times 53}$ ;  
 $\frac{53 \times 17}{31 \times 23} \times \frac{53 \times 23}{79 \times 17} \times \frac{79 \times 31}{101 \times 53} = \frac{53}{101}$ , *Ans.*

Ex. 26.  $\frac{61 \times 41}{59 \times 43} \times \frac{67 \times 43}{83 \times 41} \times \frac{63 \times 59}{97 \times 67} = \frac{61}{97}$ , *Ans.*

Ex. 27.  $\frac{47 \times 157}{97 \times 103} \times \frac{97 \times 97}{47 \times 179} \times \frac{83 \times 103}{97 \times 101} = \frac{13031}{18079}$ , *Ans.*

Ex. 28.  $\$3\frac{5}{8} \times 7 = \$25\frac{3}{8}$ , *Ans.*

Ex. 29.  $\frac{3}{4} \times \frac{3}{4} \times \frac{16}{21} \times \frac{1}{5} \times \frac{1}{5} \times \frac{1}{5} \times \frac{1}{5} \times \frac{1}{5} = 2\frac{3}{1875}$ , *Ans.*

Ex. 30.  $\frac{3}{7} \times 10 \times 6 = 25\frac{5}{7}$ , *Ans.*

Ex. 31.  $\frac{103}{8} \times \frac{103}{8} \times \frac{103}{8} \times \frac{1092727}{512} = 2134\frac{119}{512}$ , *Ans.*

Ex. 32.  $\$9\frac{3}{5} \times \frac{1}{2} \times \frac{5}{6} = \$4$ , *Ans.*

Ex. 33.  $\$ \frac{9}{16} \times 1\frac{3}{5} = \$ \frac{9}{10}$ , *Ans.*      Ex. 34.  $\$ \frac{7}{8} \times \frac{4}{7} = \$ \frac{1}{2}$ , *Ans.*

Ex. 35.  $156\frac{2}{5} \times \frac{4}{5} \times \frac{1}{2} \times \frac{3}{4} = 47$ , *Ans.*

Ex. 36.  $\frac{3}{8} \times \frac{3}{8} \times \frac{3}{8} \times \frac{1}{2} \times \frac{1}{2} \times \frac{9}{10} \times \frac{9}{10} \times \frac{10}{3} \times \frac{10}{3} \times \frac{10}{3} \times \frac{10}{3}$   
 $= 6\frac{75}{612}$ , *Ans.*

Ex. 37.  $1\frac{7}{9} \times 6 \times 8\frac{9}{10} = 94\frac{14}{15}$ , *Ans.*

Ex. 38.  $\frac{6}{7} \times 121\frac{4}{5} = 104\frac{2}{5}$ ;  $\frac{3}{4} \times 48\frac{2}{3} = 36\frac{1}{2}$ ;

$104\frac{2}{5} + 36\frac{1}{2} - 75 = 65\frac{9}{10}$ ;

$150\frac{1}{2} - 65\frac{9}{10} = 84\frac{3}{5}$ , multiplicand;

$\frac{4}{5} \times 1\frac{1}{8} \times 4 = 3\frac{3}{5}$ ;  $3\frac{3}{5} - 2\frac{1}{4} = 1\frac{7}{20}$ ;

$1\frac{7}{20} \times 3 = 4\frac{1}{20}$ , multiplier;

$84\frac{3}{5} \times 4\frac{1}{20} = 342\frac{63}{100}$ , *Ans.*

Ex. 39.  $\frac{1}{2} \times \frac{5}{6} \times \frac{5}{7} = \frac{25}{84}$ , *Ans.*

Ex. 40.  $\frac{5}{6} - (\frac{3}{4} \times \frac{5}{6}) = \frac{5}{24}$ , A's share;

$\frac{3}{4} \times \frac{5}{6} - (\frac{1}{2} \times \frac{3}{4} \times \frac{5}{6}) = \frac{5}{16}$ , B's share;

$\frac{1}{2} \times \frac{3}{4} \times \frac{5}{6} - (\frac{2}{3} \times \frac{1}{2} \times \frac{3}{4} \times \frac{5}{6}) = \frac{5}{48}$ , C's share;

$\frac{2}{3} \times \frac{1}{2} \times \frac{3}{4} \times \frac{5}{6} = \frac{5}{24}$ , D's share.

Ex. 41.  $2\frac{1}{4} \times \frac{1}{5} = \frac{9}{20}$ ;  $\frac{5}{8} \times 4\frac{1}{4} \times (\frac{2}{5})^2 = \frac{17}{30}$ ;  $(3\frac{2}{3})^3 - (3\frac{2}{3})^2$   
 $= 35\frac{2}{3}$ ;  $\frac{9}{20} + \frac{17}{30} + 35\frac{2}{3} = 36\frac{469}{540}$ , *Ans.*

---

## DIVISION.

(195, page 108.)

Ex. 2.  $\frac{10}{11} \times \frac{1}{5} = \frac{2}{11}$ ;  $\frac{128}{135} \times \frac{1}{80} = \frac{8}{675}$ .

Ex. 3.  $\frac{10}{1} \times \frac{7}{2} = 35$ , *Ans.*

Ex. 4.  $2\frac{8}{1} \times \frac{4}{3} = 11\frac{2}{3} = 37\frac{1}{3}$ ;  $\frac{3}{1} \times \frac{12}{5} = \frac{36}{5} = 7\frac{1}{5}$ .

Ex. 5.  $\frac{56}{1} \times \frac{9}{14} = 36$ , *Ans.* Ex. 6.  $\frac{15}{24} \times \frac{6}{5} = \frac{3}{4}$ , *Ans.*

Ex. 7.  $\frac{16}{27} \times \frac{9}{8} = \frac{2}{3}$ ;  $\frac{12}{55} \times \frac{77}{9} = \frac{28}{15} = 1\frac{13}{15}$ ;  $\frac{2^3}{6} \times \frac{9}{46} = \frac{3}{4}$ .

Ex. 8.  $\frac{15}{8} \times \frac{8}{9} = \frac{5}{3} = 1\frac{2}{3}$ , *Ans.*

Ex. 9.  $\frac{105}{91} \times \frac{52}{35} = \frac{12}{7} = 1\frac{5}{7}$ , *Ans.*

Ex. 11.  $\frac{4}{9} \times \frac{5}{11} \times \frac{11}{8} \times \frac{18}{5} = 1$ , *Ans.*

Ex. 12.  $\frac{7}{12} \times \frac{8}{13} \times \frac{9}{7} \times \frac{21}{5} = \frac{126}{65} = 1\frac{61}{65}$ , *Ans.*

Ex. 13.  $\frac{5}{2} \times \frac{36}{5} \times \frac{3}{10} \times \frac{10}{33} = \frac{18}{11} = 1\frac{7}{11}$ , *Ans.*

Ex. 14.  $\frac{11}{1} \times \frac{3}{2} \times \frac{2}{11} \times \frac{1}{7} = \frac{3}{7}$ , *Ans.*

Ex. 15.  $\frac{13}{4} \times \frac{19}{1} \times \frac{5}{1} \times \frac{5}{38} \times \frac{8}{13} = 25$ , *Ans.*

Ex. 16.  $\frac{5}{12} \times \frac{18}{25} \times \frac{2}{1} \times \frac{8}{7} \times \frac{17}{5} \times \frac{35}{34} \times \frac{72}{51} = 3\frac{3}{5}$ , *Ans.*

Ex. 17.  $\frac{391}{589} \times \frac{1178}{667} = \frac{17 \times 23}{19 \times 31} \times \frac{2 \times 19 \times 3}{2 \times 9} = \frac{34}{29} = 1\frac{5}{29}$ , *Ans.*

Ex. 18.  $\frac{13 \times 13 \times 31}{7 \times 59 \times 67} \times \frac{59}{31} \times \frac{56}{39} \times \frac{67}{64} = \frac{13}{24}$ , *Ans.*

Ex. 19.  $\frac{1}{2} \times \frac{2}{3} \times \frac{3}{4} \times \frac{4}{5} \times \frac{5}{6} \times \frac{6}{7} \times \frac{7}{8} \times \frac{8}{9} \times \frac{10}{9} = \frac{2}{5}$ , *Ans.*

Ex. 22.  $\frac{\frac{2}{3} \times \frac{11}{12}}{\frac{1}{18} \times 5\frac{1}{2}} = \frac{2}{3} \times \frac{11}{12} \times \frac{18}{1} \times \frac{2}{11} = 2$ , *Ans.*

Ex. 23.  $7 + 3\frac{5}{8} = 10\frac{5}{8}$ ;  $\frac{10\frac{5}{8}}{1\frac{5}{12}} = \frac{85}{8} \times \frac{12}{17} = \frac{15}{2} = 7\frac{1}{2}$ , *Ans.*

Ex. 24.  $\frac{3}{4} - \frac{1}{5} = \frac{3}{20}$ ;  $\frac{1}{3} + \frac{3}{8} = \frac{17}{24}$ ;  $\frac{\frac{3}{20}}{\frac{17}{24}} = \frac{3}{20} \times \frac{24}{17} = \frac{18}{85}$ , *Ans.*

$$\text{Ex. 25. } \frac{5}{7} - \frac{2}{3} = \frac{1}{21} \quad \frac{\frac{1}{21}}{\frac{1}{3} \times \frac{2}{7}} = \frac{1}{21} \times \frac{3}{1} \times \frac{7}{2} = 2, \text{ Ans.}$$

$$\text{Ex. 26. } 6\frac{1}{5} - 5\frac{4}{15} = 1\frac{4}{15}; \quad \frac{\frac{5}{9} \times \frac{3}{7}}{\frac{14}{15}} = \frac{5}{9} \times \frac{3}{7} \times \frac{15}{14} = \frac{25}{98}, \text{ Ans.}$$

$$\text{Ex. 27. } \$\frac{4}{5} \div 7 = \$\frac{4}{5} \times \frac{1}{7} = \frac{4}{35}, \text{ Ans.}$$

$$\text{Ex. 28. } \$6\frac{1}{2} \div \$\frac{3}{8} = \frac{1}{2} \times \frac{8}{3} = \frac{5^2}{3} = 17\frac{1}{3}, \text{ Ans.}$$

$$\text{Ex. 29. } \$30 \div \frac{9}{4} = \$\frac{30}{1} \times \frac{4}{9} = \$\frac{135}{2} = \$67\frac{1}{2}, \text{ Ans.}$$

$$\text{Ex. 30. } \$\frac{9}{10} \div (\frac{1}{2} \times \$\frac{3}{4}) = \frac{9}{10} \times \frac{2}{1} \times \frac{4}{3} = \frac{12}{5} = 2\frac{2}{5} \text{ pints, Ans.}$$

$$\text{Ex. 31. } \$2\frac{1}{6} \div \frac{3}{10} = \$\frac{13}{6} \times \frac{10}{3} = \$\frac{65}{9} = \$7\frac{2}{9}, \text{ Ans.}$$

$$\text{Ex. 32. } \$\frac{30}{1} \times \frac{1}{3} \times \frac{2}{5} \times \frac{5}{1} \times \frac{3}{13} = \$\frac{60}{13} = \$4\frac{8}{13}, \text{ Ans.}$$

$$\text{Ex. 33. } (\$1725\frac{3}{8} \div 235\frac{1}{2}) \times 125\frac{1}{3} =$$

$$\$1380\frac{3}{8} \times \frac{2}{471} \times \frac{376}{3} = \$918\frac{1}{4}\frac{16}{71}, \text{ Ans.}$$

$$\text{Ex. 34. } 26\frac{1}{4} \div \frac{5}{6} = \frac{105}{4} \times \frac{6}{5} = \frac{63}{2} = 31\frac{1}{2}, \text{ Ans.}$$

$$\text{Ex. 35. } 27 \div 2\frac{5}{9} = \frac{27}{1} \times \frac{9}{23} = \frac{243}{23} = 10\frac{13}{23}, \text{ Ans.}$$

$$\text{Ex. 36. } 148\frac{3}{4} \div 16\frac{1}{12} = \frac{595}{4} \times \frac{12}{203} = \frac{255}{29} = 8\frac{23}{29}, \text{ Ans.}$$

$$\text{Ex. 37. } \frac{7}{9} \times \frac{8}{3} \times \frac{6}{5} \times \frac{1}{2} = \frac{56}{45} = 1\frac{11}{45}, \text{ Ans.}$$

$$\text{Ex. 38. } 28 - 7\frac{1}{2} = 20\frac{1}{2}; \quad 20\frac{1}{2} \times \frac{5}{8} = 12\frac{1}{8}; \quad 720 - 12\frac{1}{8} =$$

$$707\frac{3}{8}; \quad \frac{9}{10} \div \frac{3}{5} = 1\frac{1}{2}; \quad 40\frac{1}{4} + 1\frac{1}{2} = 41\frac{3}{4}; \quad 41\frac{3}{4} \times$$

$$(\frac{1}{2})^4 = 2\frac{39}{64}; \quad 707\frac{3}{8} \div 2\frac{39}{64} = \frac{11315}{16} \times \frac{64}{167} = \frac{45260}{167} =$$

$$271\frac{3}{167}, \text{ Ans.}$$

$$\text{Ex. 39. } 3\frac{1}{2} \times (\frac{2}{5})^2 = \frac{14}{5}; \quad \frac{3}{4} \times \frac{1}{3} = \frac{1}{4}; \quad \frac{14}{5} + \frac{1}{4} = \frac{81}{100};$$

$$\frac{2}{7} \div (\frac{2}{3})^3 \times 5 = 4\frac{23}{8}; \quad 17\frac{1}{8} - \frac{3}{5} + 4\frac{23}{8} = 21\frac{97}{80} = \frac{5977}{280};$$

$$\frac{81}{100} \times \frac{81}{100} \times \frac{81}{100} \times \frac{280}{5977} = \frac{3720087}{149425000}, \text{ Ans.}$$

$$\text{Ex. 40 } \frac{1}{3} \times \frac{8}{125} \times \frac{1}{4} \times \frac{2}{1} \times \frac{4}{37} \times \frac{8}{16} \times \frac{8}{11} \times \frac{8}{1} \times \frac{4}{3} \times \frac{3}{16}$$

$$= \frac{224}{1682375}, \text{ Ans.}$$

## GREATEST COMMON DIVISOR OF FRACTIONS.

(198, page 112.)

- Ex. 1.** The greatest common divisor of 7, 14, and 28 is 7  
the least common multiple of 9, 27, and 45 is 135;

*Ans.*  $\frac{7}{135}$ .

- Ex. 2.**  $3\frac{1}{5}, 1\frac{5}{7}, \frac{24}{35} = \frac{16}{5}, \frac{12}{7}, \frac{24}{35}$ ;  
the greatest common divisor of 16, 12, and 24 is 4;  
the least common multiple of 5, 7, and 35 is 35;

*Ans.*  $\frac{4}{35}$ .

- Ex. 3.**  $4, 2\frac{2}{9}, 2\frac{2}{5}, \frac{4}{90} = \frac{4}{1}, \frac{20}{9}, \frac{12}{5}, \frac{2}{45}$ ;  
greatest common divisor of 4, 20, 12, and 2 is 2;  
least common multiple of 1, 9, 5, and 45 is 45;

*Ans.*  $\frac{2}{45}$ .

- Ex. 4.**  $109\frac{1}{5}, 122\frac{4}{7} = \frac{546}{5}, \frac{858}{7}$ ;  
greatest common divisor of 546 and 858 is 78;  
least common multiple of 5 and 7 is 35;

 $\frac{78}{35} = 2\frac{8}{5}$ , *Ans.*

- Ex. 5.** The measure will be the greatest common divisor of  
 $18\frac{2}{5}$  feet and  $57\frac{1}{2}$  feet, which is  $2\frac{3}{10}$  feet, *Ans.*

- Ex. 6.** The greatest common divisor of  $134\frac{3}{4}$  gallons,  $128\frac{1}{3}$   
gallons, and  $115\frac{1}{2}$  gallons, is  $6\frac{5}{12}$  gallons, the capac-  
ity of the casks required. Hence,

$$134\frac{3}{4} \div 6\frac{5}{12} = 21, \text{ number of casks for the first kind;}$$

$$128\frac{1}{3} \div 6\frac{5}{12} = 20, \quad \text{“} \quad \text{“} \quad \text{“} \quad \text{second “}$$

$$115\frac{1}{2} \div 6\frac{5}{12} = 18, \quad \text{“} \quad \text{“} \quad \text{“} \quad \text{third “}$$

---

59, *Ans.*

## LEAST COMMON MULTIPLE OF FRACTIONS.

(201, page 113.)

- Ex. 1. The least common multiple of 2, 7, 14, and 8 is 56;  
the greatest common divisor of 5, 10, 15, and 25 is 5;  
 $\frac{56}{5} = 11\frac{1}{5}$ , *Ans.*
- Ex. 2. The least common multiple of 7, 35, and 49 is 245;  
the greatest common divisor of 24, 36, and 60 is 12;  
 $\frac{245}{12} = 20\frac{5}{12}$ , *Ans.*
- Ex. 3.  $\frac{222}{25}, \frac{137}{75}, \frac{63}{100} = \frac{72}{25}, \frac{112}{75}, \frac{63}{100}$ ;  
least common multiple of 72, 112, and 63 is 1008;  
greatest common divisor of 25, 75 and 100 is 25;  
 $\frac{1008}{25} = 40\frac{8}{25}$ , *Ans.*
- Ex. 4. Least common multiple of 1, 2, 3, 4, 5, 6, 7, 8, 9, is  
2520; greatest common divisor of 2, 3, 4, 5, 6, 7,  
8, 9, 10, is 1. *Ans.* 2520.
- Ex. 5. The train must move a distance equal to the least  
common multiple of  $15\frac{5}{16}$  feet and  $9\frac{3}{8}$  feet, which  
is  $459\frac{3}{8}$  feet, *Ans.*

## PROMISCUOUS EXAMPLES

(Page 114.)

- Ex. 1.  $\frac{7}{9} \times \frac{5}{7} = \frac{5}{9}$ ;  $135 \div 9 = 15$ ;  $\frac{5}{9} = \frac{75}{135}$ , *Ans.*
- Ex. 2.  $48 \div 4 = 12$ ;  $48 \div 6 = 8$ ;  $48 \div 8 = 6$ ;  $48 \div 12 = 4$ ;  
 $\frac{3}{4}, \frac{1}{6}, \frac{5}{8}, \frac{11}{12} = \frac{36}{48}, \frac{8}{48}, \frac{30}{48}, \frac{44}{48}$ , *Ans.*
- Ex. 3.  $\frac{1}{3}, \frac{6}{7}, 2, \frac{7}{10}, \frac{2}{3}$  of  $\frac{4}{5}, \frac{4}{9}$  of  $\frac{1}{4} = \frac{4}{3}, \frac{6}{7}, \frac{2}{1}, \frac{7}{10}, \frac{8}{15}, \frac{1}{9}$ ;  
 $3 \times 5 \times 3 \times 2 \times 7 = 630$ , *Ans.*

(113, 114)



$$\text{Ex. 4. } \frac{\frac{2}{3} \times \frac{3}{4}}{\frac{1}{2}} = 1; \frac{\frac{2}{5} \times \frac{5}{8}}{\frac{2}{9} \times 4\frac{1}{2}} = \frac{1}{3};$$

$$1 + \frac{1}{3}; = 1\frac{1}{3}; 1 - \frac{1}{3} = \frac{2}{3}; 1\frac{1}{3} \div \frac{2}{3} = 2, \text{ Ans.}$$

$$\text{Ex. 5. } \frac{54\frac{3}{5}}{\frac{1}{5} \times 8\frac{2}{3}} = 31\frac{1}{2}; \frac{1\frac{5}{9}}{\frac{9}{16}} = 2\frac{62}{81}; 31\frac{1}{2} + 2\frac{62}{81} = 34\frac{43}{162}, \text{ Ans.}$$

$$\text{Ex. 6. } \frac{23}{84} \times \frac{9}{2} \times \frac{8}{5} \times \frac{7}{23} = \frac{3}{5}, \text{ Ans.}$$

$$\text{Ex. 7. } \frac{2 - \frac{1}{4}}{2} \times \frac{(8\frac{4}{7})^2}{12} = \frac{7}{8} \times \frac{60}{7} \times \frac{60}{7} \times \frac{1}{12} = 5\frac{5}{14} = 5\frac{50}{140};$$

$$(2 + \frac{1}{5}) \div (3 + \frac{1}{7}) = \frac{11}{5} \times \frac{7}{22} = \frac{7}{10} = \frac{98}{140};$$

$$\frac{11\frac{3}{2}}{87} = \frac{355}{32} \times \frac{8}{71} = 1\frac{1}{4} = 1\frac{35}{140};$$

$$7\frac{43}{140}, \text{ Ans.}$$

$$\text{Ex. 8. } \frac{7}{9} - \frac{2}{7} = \frac{3}{63}. \text{ A number diminished by } \frac{3}{63} \text{ of itself}$$

will leave a remainder of  $1 - \frac{3}{63} = \frac{60}{63}$  of itself; hence,

$$144 \div \frac{60}{63} = 288\frac{1}{2}, \text{ Ans.}$$

$$\text{Ex. 9. } \frac{1}{3} + \frac{2}{5} + \frac{1}{8} = \frac{103}{120}; 1 - \frac{103}{120} = \frac{17}{120} \text{ of his money left;}$$

hence,  $\$119 \div \frac{17}{120} = \$840, \text{ Ans.}$

$$\text{Ex. 10. } \$42 \times \frac{4}{29} \times \frac{1}{2} \times \frac{87}{8} = \$31\frac{1}{2}, \text{ Ans.}$$

$$\text{Ex. 11. Since the less is } \frac{5}{7} \text{ of the greater, their difference is}$$

$$\frac{7}{7} - \frac{5}{7} = \frac{2}{7} \text{ of the greater; hence, } 25\frac{7}{15} \div \frac{2}{7} = 89\frac{2}{15},$$

the greater number;  $89\frac{2}{15} - 25\frac{7}{15} = 63\frac{2}{3}$ , the less.

$$\text{Ex. 12. The two shares together must be } \frac{9}{9} + \frac{7}{9} = \frac{16}{9} \text{ times the}$$

greater share; hence,  $\$2000 \div \frac{16}{9} = \$1125$ , the greater share;  $\$2000 - \$1125 = \$875$ , the less share.

$$\text{Ex. 13. } \frac{4}{1} \times \frac{5}{3} \times \frac{3}{2} = 10, \text{ Ans.}$$

$$\text{Ex. 14. } \$\frac{65}{6} \div \$\frac{7}{9} = 13\frac{13}{14}, \text{ Ans.}$$

$$\text{Ex. 15. } \frac{22}{3} \times \frac{2}{3} \times \frac{5}{2} = 12\frac{2}{3}, \text{ Ans.}$$

$$\text{Ex. 16. } \frac{1}{1} \times \frac{3}{2} = \text{bushels of corn that can be bought for } \$15;$$

$$\frac{15}{1} \times \frac{3}{2} \times \frac{4}{3} \times \frac{3}{5} = 18 \text{ bushels of barley, Ans.}$$



Ex. 17.  $\frac{4^8}{1} \times \frac{7}{5} \times \frac{3}{4} = 50\frac{2}{5}$ , *Ans.*

Ex. 18.  $\frac{4^1}{2} \times \frac{5}{4} =$  the number of yards of cloth 1 yard wide;  
 $\frac{4^1}{2} \times \frac{5}{4} \times \frac{4}{3} = 34\frac{1}{6}$  yards, *Ans.*

Ex. 19.  $\frac{5}{8} \times \frac{4}{5} = \frac{1}{2}$  of the foundery sold for  $\$2570\frac{2}{3}$ ;  
 hence,  $\$2570\frac{2}{3} \times 2 = \$5141\frac{1}{3}$ , *Ans.*

Ex. 20.  $\$10000 \times \frac{1}{4} \times \frac{4}{5} \times \frac{1^2}{7} \times \frac{9}{4} \times \frac{7}{5} \times \frac{1^0}{9} = \$12000$ , vessel;  
 $\$10000 + \$12000 = \$22000$ , *Ans.*

Ex. 21. The second son had  $\frac{2}{3}$  of  $\frac{5}{8} = \frac{5}{12}$ ; the third son had  
 $1 - (\frac{3}{8} + \frac{5}{12}) = \frac{5}{24}$ ; the difference between the shares  
 of the first and second is  $\frac{5}{12} - \frac{3}{8} = \frac{1}{24}$ ; hence,  $\$500$   
 $\div \frac{1}{24} = \$12000$ , whole estate;  $\$12000 \times \frac{5}{24} = \$2500$ ,  
 third son's share.

Ex. 22.  $\$6^0 \times \frac{2}{1^5} = \$8$ , cost of 1 ton;  $\$78 \div \$8 = 9\frac{3}{4}$ , *Ans.*

Ex. 23.  $16\frac{1}{2} \div 30 = \frac{3^3}{2} \times \frac{1}{3^0} = \frac{1^1}{2^0}$ , *Ans.*

Ex. 24.  $\frac{3}{8}$  of the whole  $+ 12\frac{1}{4}$  acres = 1st and 2d sons' shares;  
 $\frac{3}{8}$  " " "  $+ 12\frac{1}{4}$  " = 3d son's share;  
 $\frac{3}{4}$  of the whole  $+ 24\frac{1}{2}$  " = the whole; therefore,  
 $24\frac{1}{2}$  acres must be  $\frac{1}{4}$  of the whole;  $24\frac{1}{2} \times 4 = 98$  acres,  
 the whole; and  $98 \times \frac{3}{8} + 12\frac{1}{4} = 49$  acres, *Ans.*

Ex. 25.  $\$2 \times \frac{4}{3} \times \frac{1}{6} \times \frac{4}{5} = \$\frac{4}{5}$ , *Ans.*

Ex. 26.  $\$3500 - \$740 = \$2760$ , his money before gaining;  
 hence,  $\$2760 \div \frac{3}{5} = \$4600$ , money invested; and  
 $\$4600 \times \frac{2}{5} = \$1840$ , lost, *Ans.*

Ex. 27.  $\frac{2}{5}$  of  $\frac{5}{8} = \frac{1}{4}$ , *Ans.*

Ex. 28. Since A can do  $\frac{1}{8}$  of the work in 1 day, and B can  
 do  $\frac{1}{6}$  of it in 1 day, they can both do  $1 + \frac{1}{8} = \frac{7}{4}$  of  
 the work in 1 day; and if  $\frac{7}{4}$  be done in 1 day,  $\frac{1}{24}$ ,  
 or the whole work, will require  $2^4 = 3\frac{3}{4}$  days, *Ans.*

NOTE.—The time required to perform any piece of work will  
 always be the reciprocal of that fraction of the work performed  
 in 1 unit of time.

Ex. 29.  $6\frac{5}{2} \times \frac{8}{5} \times \frac{1}{4} = 13$  barrels, sold at \$4 per barrel;  
 $13 + 5 = 18$  barrels, *Ans.*

Ex. 30. The number will be the least common multiple of  
 $\frac{5}{6}$ ,  $\frac{3}{8}$ ,  $\frac{6}{7}$  and  $\frac{4}{5}$ , which is 60, *Ans.*

Ex. 31. According to the note above, A will travel round  
the island, and be again at the point of starting;  
once in  $\frac{7}{2}$  days, B once in  $\frac{17}{4}$  days, and C once in  
 $\frac{51}{8}$  days; and the least common multiple of  $\frac{7}{2}$  days,  
 $\frac{17}{4}$  days, and  $\frac{51}{8}$  days, is  $3\frac{57}{2} = 178\frac{1}{2}$  days, *Ans.*

Ex. 32. The sum of the distances traveled by the two men  
is  $64\frac{3}{4}$  miles, and the difference of these distances is  
 $5\frac{1}{2}$  miles. Hence, by Problem 33, page 64, of the  
Arithmetic, we have

$64\frac{3}{4} + 5\frac{1}{2} = 70\frac{1}{4}$ ;  $70\frac{1}{4} \div 2 = 35\frac{1}{8}$  miles, the greater  
journey;  $64\frac{3}{4} - 5\frac{1}{2} = 59\frac{1}{4}$ ;  $59\frac{1}{4} \div 2 = 29\frac{5}{8}$  miles, the  
less journey.

Ex. 33.  $1\frac{1}{10} + \frac{2}{5} = 1\frac{1}{2}$ ;  $1\frac{1}{2} \div 2 = \frac{3}{4}$ , the greater;  
 $1\frac{1}{10} - \frac{2}{5} = \frac{7}{10}$ ;  $\frac{7}{10} \div 2 = \frac{7}{20}$ , the less.

Ex. 34.  $1 - \frac{13}{126} = \frac{113}{126}$ , the sum of B's and C's shares. And  
since  $\frac{7}{18}$  is the difference of B's and C's shares, we  
have  $\frac{113}{126} + \frac{7}{18} = \frac{9}{7}$ ;  $\frac{9}{7} \div 2 = \frac{9}{14}$ , B's share;  
 $\frac{113}{126} - \frac{7}{18} = \frac{32}{63}$ ;  $\frac{32}{63} \div 2 = \frac{16}{63}$ , C's share.

Ex. 35. The reciprocal of  $\frac{4}{5}$  is  $\frac{5}{4}$ ;  
reversing the fourth operation,  $\frac{5}{4} \times \frac{6}{25} = \frac{3}{10}$ ;  
reversing the third operation,  $\frac{3}{10} + \frac{2}{5} = \frac{7}{10}$ ;  
reversing the second operation,  $\frac{7}{10} - \frac{1}{6} = \frac{8}{15}$ ;  
reversing the first operation,  $\frac{8}{15} \times \$\frac{15}{4} = \$4$ , *Ans.*

Ex. 36.  $7\frac{1}{2}$  is a quotient and  $1\frac{2}{7}$  a divisor, and  $\frac{15}{2} \times \frac{9}{7} = \frac{135}{14}$ ,  
the dividend;  $\frac{135}{14}$  is a product and  $5\frac{2}{5}$  a multiplier,  
and  $\frac{135}{14} \div \frac{25}{5} = \frac{25}{14}$ , the multiplicand;  $\frac{25}{14}$  is a re-  
mainder and  $\frac{3}{8}$  a subtrahend, and  $\frac{25}{14} + \frac{3}{8} = \frac{121}{56}$ , the

minuend;  $\frac{121}{56}$  is the sum of two numbers and  $1\frac{3}{4}$  is one of them, and  $\frac{121}{56} - \frac{7}{4} = \frac{23}{56}$ , the required number, *Ans.*

Ex. 37.  $\frac{2}{3} \times \frac{4}{5} \times \frac{7}{2} \times \frac{7}{8} \times \frac{9}{2} = \frac{147}{20}$ ;  $\frac{147}{20} + \frac{25}{6} = \frac{691}{60}$ ;  
 $\frac{3}{7} \times \frac{691}{60} = \frac{691}{140}$ ;  $\frac{691}{60} - \frac{691}{140} = \frac{691}{105} = 6\frac{61}{105}$ , *Ans.*

## DECIMAL FRACTIONS.

### NOTATION AND NUMERATION.

(210, page 120.)

- |  |                                     |
|--|-------------------------------------|
| Ex. 4. <i>Ans.</i> .496                                | Ex. 5. <i>Ans.</i> .0325            |
| Ex. 6. <i>Ans.</i> .000001                             | Ex. 7. <i>Ans.</i> .0000074         |
| Ex. 8. <i>Ans.</i> .437549                             | Ex. 9. <i>Ans.</i> .3040010         |
| Ex. 10. <i>Ans.</i> .00000024                          | Ex. 11. <i>Ans.</i> .08645          |
| Ex. 12. <i>Ans.</i> .495705048                         | Ex. 13. <i>Ans.</i> .0000099009     |
| Ex. 14. <i>Ans.</i> .04735901                          | Ex. 15. <i>Ans.</i> .000000000001   |
| Ex. 16. <i>Ans.</i> .1001001001001                     |                                     |
| Ex. 17. <i>Ans.</i> .000841563436                      |                                     |
| Ex. 18. <i>Ans.</i> .000000000000000009                |                                     |
| Ex. 19. <i>Ans.</i> .3                                 | Ex. 25. <i>Ans.</i> 46.4            |
| Ex. 20. <i>Ans.</i> .105                               | Ex. 26. <i>Ans.</i> 205.65          |
| Ex. 21. <i>Ans.</i> .0011                              | Ex. 27. <i>Ans.</i> 60.00036        |
| Ex. 22. <i>Ans.</i> .00085                             | Ex. 28. <i>Ans.</i> 705.000000005   |
| Ex. 23. <i>Ans.</i> .100004                            | Ex. 29. <i>Ans.</i> 300.10001001    |
| Ex. 24. <i>Ans.</i> .0000704                           | Ex. 30. <i>Ans.</i> 52.000000000005 |
| Ex. 31. Twenty-four hundredths.                        |                                     |
| Ex. 32. Seventy-five thousandths.                      |                                     |
| Ex. 33. Five hundred three thousandths.                |                                     |
| Ex. 34. Seven hundred twenty-five hundred-thousandths. |                                     |
| Ex. 35. Forty million four hundred-millionths.         |                                     |

Ex. 36. Two hundred fifty-six ten-millionths.

Ex. 37. Ten thousand seventy-five ten-millionths.

Ex. 38. Eight, and twenty-five hundredths.

Ex. 39. Seventy-five, and three hundred sixty-eight thousandths.

Ex. 40. Forty-two, and six hundred thirty-seven ten-thousandths.

Ex. 41. Eight, and seventy-four ten thousandths.

Ex. 42. Thirty, and four thousand seventy-five ten-thousandths.

Ex. 43. Twenty-six, and five hundred-thousandths.

Ex. 44. One hundred, and one hundred-millionth.

### REDUCTION.

(211, page 121.)

Ex. 1. .1800000

.4560000

.0075000

.0000010

.0500000

.3789000

.5943786

.0010000

Ex. 2. .012000000000

.000185000000

.000000936000

.000000000007

Ex. 3. 57.300000

900.000000

4.755500

100.000001

(212, page 122.)

Ex. 1.  $\frac{75}{100} = \frac{3}{4}$ , Ans.

Ex. 2.  $\frac{625}{1000} = \frac{5}{8}$ , Ans.

Ex. 3.  $\frac{12}{100} = \frac{3}{25}$ , Ans.

Ex. 4.  $\frac{68}{100} = \frac{17}{25}$ , Ans.

(120—122)

Ex. 5.  $\frac{5625}{10000} = \frac{9}{16}, \text{ Ans.}$

Ex. 6.  $\frac{24}{1000} = \frac{3}{125}, \text{ Ans.}$

Ex. 7.  $\frac{32}{100000} = \frac{1}{3125}, \text{ Ans.}$

Ex. 8.  $\frac{2624}{1000000} = \frac{41}{15625}, \text{ Ans.}$

Ex. 10.  $\frac{57\frac{1}{7}}{100} = \frac{400}{700} = \frac{4}{7}, \text{ Ans.}$

Ex. 11.  $\frac{66\frac{2}{3}}{100} = \frac{200}{300} = \frac{2}{3}, \text{ Ans.}$

Ex. 12.  $\frac{444\frac{4}{9}}{1000} = \frac{4000}{9000} = \frac{4}{9}, \text{ Ans.}$

Ex. 13.  $\frac{24\frac{2}{3}}{1000} = \frac{74}{3000} = \frac{37}{1500}, \text{ Ans.}$

Ex. 14.  $\frac{984\frac{3}{8}}{1000} = \frac{7875}{8000} = \frac{63}{64}, \text{ Ans.}$

Ex. 15.  $7\frac{4}{10} = 7\frac{2}{5}, \text{ Ans.}$

Ex. 16.  $24\frac{74}{100} = 24\frac{37}{50}, \text{ Ans.}$

Ex. 17.  $\frac{21875}{100000} = \frac{35}{16}, \text{ Ans.}$

Ex. 18.  $\frac{164}{100} = \frac{41}{25}, \text{ Ans.}$

Ex. 19.  $\frac{7496}{1000} = \frac{937}{125}, \text{ Ans.}$

(214, page 123.)

Ex. 3. *Ans.* .875

Ex. 4. *Ans.* .56

Ex. 5. *Ans.* .8125

Ex. 9. *Ans.* .001796875

Ex. 11. *Ans.* .60625

Ex. 15. *Ans.* 32.714286—

Ex. 16. *Ans.* .245

Ex. 17. *Ans.* 5.783125

Ex. 20. *Ans.* .30007



## ADDITION.

(216, page 125.)

$$\begin{array}{r}
 \text{Ex. 1. } .375 \\
 .24 \\
 .536 \\
 .78567 \\
 .4637 \\
 .57439 \\
 \hline
 \end{array}$$

2.97476, *Ans.*

$$\begin{array}{r}
 \text{Ex. 2. } 5.3756 \\
 85.473 \\
 9.2 \\
 46.37859 \\
 45.248377 \\
 \hline
 \end{array}$$

191.675567, *Ans.*

$$\begin{array}{r}
 \text{Ex. 3. } .5 \\
 .37 \\
 .489 \\
 .6372 \\
 .47856 \\
 .02524 \\
 \hline
 \end{array}$$

2.50000=2.5, *Ans.*

$$\begin{array}{r}
 \text{Ex. 4. } .4675 \\
 .325125 \\
 .1616 \\
 .2754375 \\
 \hline
 \end{array}$$

1.2296625, *Ans*

$$\begin{array}{r}
 \text{Ex. 5. } 4.65 \\
 7.322 \\
 5.3784125 \\
 2.6487875 \\
 \hline
 \end{array}$$

19.9992000, *Ans.*

$$\begin{array}{r}
 \text{Ex. 6. } 4.3785 \\
 2.66666+ \\
 5.42857+ \\
 12.4872 \\
 \hline
 \end{array}$$

24.9609+, *Ans.*

$$\begin{array}{r}
 \text{Ex. 7. } .137 \\
 .435 \\
 .836 \\
 .937 \\
 .496 \\
 \hline
 \end{array}$$

2.841, *Ans.*

$$\begin{array}{r}
 \text{Ex. 8. } .0102 \\
 .13426 \\
 .000567 \\
 .000003 \\
 .24007 \\
 \hline
 \end{array}$$

.3851, *Ans.*

$$\begin{array}{r} \text{Ex. 9. } 34.72 \\ 48.44 \\ 152.17 \\ 95.36 \\ 56.18 \\ \hline \end{array}$$

*Ans.* 386.87 rods.

$$\begin{array}{r} \text{Ex. 10. } \frac{24}{97} = .24743+ \\ \frac{75}{436} = .17224+ \\ \frac{37}{150} = .24666+ \\ \frac{1}{1728} = .00058- \\ \hline \end{array}$$

$$\begin{array}{r} .66691\pm = \\ .6669+, \text{ Ans.} \end{array}$$

$$\begin{array}{r} \text{Ex. 11. } 16\frac{6}{19} = 16.316- \\ 15\frac{2}{17} = 15.118- \\ 18\frac{15}{31} = 18.484- \\ 14\frac{7}{45} = 14.155+ \\ \hline \end{array}$$

64.07+, *Ans.*

$$\begin{array}{r} \text{Ex. 12. } .45 \\ .0275 \\ .009125 \\ .000304 \\ \hline .486929, \text{ Ans.} \end{array}$$

Ex. 13. 1 dec. unit of the first order=.1

$$\begin{array}{rcl} \frac{1}{2} & \text{" " " second} & \text{" =.005} \\ \frac{1}{3} & \text{" " " third} & \text{" =.0003333333+} \\ \frac{1}{4} & \text{" " " fourth} & \text{" =.000025} \\ \frac{1}{5} & \text{" " " fifth} & \text{" =.000002} \\ \frac{1}{6} & \text{" " " sixth} & \text{" =.00000016666+} \\ \frac{1}{7} & \text{" " " seventh} & \text{" =.00000001428+} \\ \hline \end{array}$$

*Ans.* .1053605143—

## SUBTRACTION.

(217, page 126.)

$$\begin{array}{r} \text{Ex. 4. } 37.456 \\ 24.367 \\ \hline 13.089, \text{ Ans.} \end{array}$$

$$\begin{array}{r} \text{Ex. 6. } 1000.000 \\ .001 \\ \hline 999.999, \text{ Ans.} \end{array}$$

$$\begin{array}{r} \text{Ex. 5. } 1.0066 \\ .15 \\ \hline .8566, \text{ Ans.} \end{array}$$

$$\begin{array}{r} \text{Ex. 7. } 36.75 \\ 22.48 \\ \hline 14.27, \text{ Ans.} \end{array}$$

(125, 126)

$$\begin{array}{r} \text{Ex. 8. } .56875 \\ .55992 \\ \hline \end{array}$$

.00883, *Ans.*

$$\begin{array}{r} \text{Ex. 9. } 7.33333+ \\ 5.5625 \\ \hline \end{array}$$

1.7708+, *Ans*

$$\begin{array}{r} \text{Ex. 10. } \frac{991}{997} = .9939819+ \\ \frac{719}{761} = .9448094+ \\ \hline \end{array}$$

.0491725±, *Ans.*

$$\begin{array}{r} \text{Ex. 11. } 1. \\ .000000000001 \\ \hline \end{array}$$

*Ans.* .999999999999

$$\begin{array}{r} \text{Ex. 12. } 57436.00 \\ \hline \end{array}$$

536.74

1756.19

3678.47

9572.15

7536.59

4785.94

*Ans.* 29569.92 acres.

$$\begin{array}{r} \text{Ex. 13. } \frac{54321}{12345} = 4.400243+ \\ \frac{12345}{54321} = .227260+ \\ \hline \end{array}$$

4.17298+, *Ans.*

## MULTIPLICATION.

(219, page 127.)

$$\text{Ex. 2. } \text{Ans. } .10464$$

$$\text{Ex. 5. } \text{Ans. } 9.3654$$

$$\text{Ex. 8. } \text{Ans. } 104.976$$

$$\text{Ex. 9. } \text{Ans. } 17.019$$

$$\text{Ex. 11. } \text{Ans. } 360.$$

$$\text{Ex. 12. } \text{Ans. } 1.$$

$$\text{Ex. 13. } \text{Ans. } 57600.$$

$$\text{Ex. 15. } \text{Ans. } 15.15$$

$$\text{Ex. 18. } \text{Ans. } 4.626$$

$$\begin{array}{r} \text{Ex. 20. } \text{Ans. } 168.48 \times 27.375 \\ = 4612.14 \text{ pounds, } \text{Ans.} \end{array}$$

$$\begin{array}{r} \text{Ex. 21. } 2.8 \times 36 = 100.8 \text{ bushels of oats for 36 bushels of} \\ \text{corn; } 100.8 + 48 = 148.8, \text{ } \text{Ans.} \end{array}$$

## CONTRACTED MULTIPLICATION.

(222, page 131.)

$$\begin{array}{r}
 \text{Ex. 2.} \quad 36.275 \\
 763.4 \\
 \hline
 1451 \\
 109 \\
 22 \\
 2 \\
 \hline
 158.4 \pm, \text{Ans.}
 \end{array}$$

$$\begin{array}{r}
 \text{Ex. 3.} \quad .24367 \\
 57.63 \\
 \hline
 731 \\
 146 \\
 17 \\
 1 \\
 \hline
 8.95 \pm, \text{Ans.}
 \end{array}$$

$$\begin{array}{r}
 \text{Ex. 4.} \quad 4256.785 \\
 46500. \\
 \hline
 21284 \\
 2554 \\
 170 \\
 \hline
 24.008 \pm, \text{Ans.}
 \end{array}$$

$$\begin{array}{r}
 \text{Ex. 5.} \quad 357.84327 \\
 608700.1 \\
 \hline
 357 \ 8433 \\
 2 \ 5049 \\
 2863 \\
 21 \\
 \hline
 360.6366 \pm, \text{Ans.}
 \end{array}$$

$$\begin{array}{r}
 \text{Ex. 6.} \quad 400.756 \\
 85763.1 \\
 \hline
 400 \ 76 \\
 120 \ 23 \\
 24 \ 05 \\
 2 \ 80 \\
 20 \\
 3 \\
 \hline
 548.07 \pm, \text{Ans.}
 \end{array}$$

$$\begin{array}{r}
 \text{Ex. 7.} \quad 432.5672 \\
 666660.1 \\
 \hline
 432 \ 567 \\
 25 \ 954 \\
 2 \ 595 \\
 260 \\
 26 \\
 3 \\
 \hline
 461.405 \pm, \text{Ans.}
 \end{array}$$

$$\begin{array}{r} \text{Ex. 8} \quad 48.4367 \\ + 31531.2 = 2\frac{5}{37} \\ \hline \end{array}$$

96873

4844

1453

242

5

1

 $103.418 \pm, \text{Ans.}$ 

$$\begin{array}{r} \text{Ex 10.} \quad 142.8373 + \\ 53025.2 \\ \hline \end{array}$$

28567

7142

286

4

1

 $\text{Ans. } 360.00 \pm \text{ degrees.}$ 

$$\begin{array}{r} \text{Ex. 12.} \quad 478.7862 \\ 65390.1 \\ \hline \end{array}$$

47879

4308

144

24

3

 $\text{Ans. } 523.58 \pm \text{ yards.}$ 

$$\begin{array}{r} \text{Ex. 9.} \quad 7.04424 = 7\frac{5}{113} \\ + 94658.3 = 3\frac{376}{439} \\ \hline \end{array}$$

21133

5635

352

42

3

1

 $27.166 \pm, \text{Ans.}$ 

$$\begin{array}{r} \text{Ex. 11.} \quad 35.8756 \\ 8833.8 \\ \hline \end{array}$$

28700

1076

108

29

3

 $\text{Ans. } 299.16 \pm \text{ pounds.}$ 

$$\begin{array}{r} \text{Ex. 13.} \quad 6377397.6 \\ 643126000. \\ \hline \end{array}$$

382644

12755

638

191

25

4

 $\text{Equatorial radius, } 3962.57 \pm \text{ miles.}$



$$\begin{array}{r}
 6356078.96 \\
 643126000. \\
 \hline
 381365 \\
 12712 \\
 636 \\
 191 \\
 25 \\
 4 \\
 \hline
 \end{array}$$

Polar radius,  $3949.33 \pm$  miles.

## DIVISION.

(224, page 133.)

- |   |                            |
|---|----------------------------|
| Ex. 4. <i>Ans.</i> .2                                 | Ex. 7. <i>Ans.</i> .8666+  |
| Ex. 9. <i>Ans.</i> .00666+                            | Ex. 10. <i>Ans.</i> .0075  |
| Ex. 11. <i>Ans.</i> .0000436                          | Ex. 12. <i>Ans.</i> .8333+ |
| Ex. 13. <i>Ans.</i> .6455                             | Ex. 14. <i>Ans.</i> 6.165  |
| Ex. 15. $16.2 \div 2.7 = 6$ , <i>Ans.</i>             |                            |
| Ex. 16. $674 \div 36.34 = 18.547$ + days, <i>Ans.</i> |                            |
| Ex. 17. $5280 \div 14.25 = 370.5$ +, <i>Ans.</i>      |                            |

## CONTRACTED DIVISION.

(226, page 135.)

Contracted decimal division is most readily performed by the method of inverting the quotient, described in Note 2, page 135, of the Arithmetic.

(132—135)

Ex. 1.  $4.3267 \overline{)27.3782}$

$823.6 \quad 25960$

$\underline{1418}$

*Ans.*  $6.328 \pm$

$1298$

$\underline{120}$

$87$

$\underline{33}$

$34$

Ex. 2.  $1.003675 \overline{)487.24}$

$64.584 \quad 40147$

$\underline{8577}$

*Ans.*  $485.46 \pm$

$8029$

$\underline{548}$

$502$

$\underline{46}$

$40$

$\underline{6}$

Ex. 3.  $75.430 \overline{)8.47326}$

$33211. \quad 75430$

$\underline{9302}$

*Ans.*  $.11233$

$7543$

$\underline{1759}$

$1509$

$\underline{250}$

$226$

$\underline{24}$

$23$

Ex. 4.  $.075637 \overline{).8487564}$

$122.11 \quad 75637$

$\underline{9238}$

*Ans.*  $11.221 \pm$

$7564$

$\underline{1674}$

$1513$

$\underline{161}$

$151$

$\underline{10}$

$8$

In the following operations, Abbreviated Long Division is combined with decimal contraction, (see Arithmetic, **112**, page 50).

Ex. 5.  $1.436666+ \overline{)478.325}$

$249.233 \quad 47325$

$4225$

*Ans.*  $332.942 \pm$

$1352$

$59$

$2$

Ex. 6.  $756.3452 \overline{)8972.436}$

$9268.11 \quad 140898$

$65263$

*Ans.*  $11.8629 \pm$

$4756$

$218$

$67$

Ex. 7.	1.007633)1.000000	Ex. 8.	44.736546).95372843
	5 24299.		93130
			2443
Ans.	.992425±		428
			25
			5
			347
			34
			3
Ex. 9.	5737)4273.0		
	8447. 257 1		
			27 6
Ans.	.7448±		47
			1

---

## CIRCULATING DECIMALS.

## REDUCTION.

(238, page 139.)

Ex. 1.	$.4\dot{5} = \frac{45}{99} = \frac{5}{11}$ , Ans.	Ex. 2.	$.6\dot{6} = \frac{66}{99} = \frac{2}{3}$ , Ans.
Ex. 3.	$.27\dot{9} = \frac{279}{999} = \frac{31}{111}$ , Ans.		
Ex. 4.	$.42\dot{3} = \frac{423}{999} = \frac{47}{111}$ , Ans.		
Ex. 5.	$.92307\dot{6} = \frac{923076}{999999} = \frac{12}{13}$ , Ans.		
Ex. 6.	$.9512\dot{1} = \frac{95121}{99999} = \frac{39}{41}$ , Ans.		
Ex. 7.	$4.7\dot{2} = 4\frac{72}{99} = 4\frac{8}{11}$ , Ans.		
Ex. 8.	$2.29\dot{7} = 2\frac{297}{999} = 2\frac{11}{37} = \frac{85}{37}$ , Ans.		
Ex. 9.	$2.97\dot{2} = 2\frac{972}{999} = 2\frac{36}{37} = \frac{110}{37}$ , Ans.		
Ex. 10.	$15.0\dot{1}5 = 15\frac{15}{999} = 15\frac{5}{333}$ , Ans.		

(239, page 141.)

Ex. 1.	$.5\dot{7} = \frac{57}{90} = \frac{52}{45}$ , Ans.
Ex. 2.	$.04\dot{8} = \frac{48}{900} = \frac{44}{225}$ , Ans.

(136—141)

- Ex. 3.  $.647\dot{2} = \frac{6472 - 64}{9900} = \frac{6408}{9900} = \frac{178}{275}, \text{ Ans.}$   
 Ex. 4.  $.659\dot{0} = \frac{6590 - 65}{9900} = \frac{6525}{9900} = \frac{29}{44}, \text{ Ans.}$   
 Ex. 5.  $.046\dot{4}8 = \frac{4648 - 4}{99900} = \frac{4644}{99900} = \frac{43}{925}, \text{ Ans.}$   
 Ex. 6.  $.100\dot{4} = \frac{1004 - 100}{9000} = \frac{904}{9000} = \frac{113}{1125}, \text{ Ans.}$   
 Ex. 7.  $.928571\dot{4} = \frac{9285714 - 9}{9999990} = \frac{9285705}{9999990} = \frac{13}{14}, \text{ Ans.}$   
 Ex. 8.  $5.2\dot{7} = \frac{527 - 52}{90} = \frac{475}{90} = \frac{95}{18}, \text{ Ans.}$   
 Ex. 9.  $7.012\dot{6} = 7\frac{125}{9900} = 7\frac{5}{396}, \text{ Ans.}$   
 Ex. 10.  $1.582\dot{3}1707 = \frac{158231707 - 1582}{99999000} = \frac{519}{328}, \text{ Ans.}$   
 Ex. 11.  $2.02926\dot{8} = \frac{2029268 - 20}{999990} = \frac{416}{205}, \text{ Ans.}$

(240, page 142.)

- Ex. 1.  $.4\dot{3} = .43\dot{3}3333\dot{3}$   
 $.5\dot{7} = .57\dot{5}7575\dot{7}$   
 $.456\dot{7} = .456\dot{7}567\dot{5}$   
 $.503\dot{7} = .503\dot{7}373\dot{7}$
- Ex. 2.  $.57\dot{8} = .578\dot{8}8$   
 $.3\dot{7} = .373\dot{7}3$   
 $.248\dot{5} = .248\dot{5}5$   
 $.04 = .040\dot{4}0$
- Ex. 3.  $1.\dot{3}4 = 1.34\dot{1}341\dot{3}$   
 $4.5\dot{6} = 4.56\dot{4}564\dot{5}$   
 $.34\dot{1} = .341\dot{4}14\dot{1}$
- Ex. 4.  $.567\dot{4} = .567456745674\dot{5}$   
 $.3\dot{4} = .344444444444\dot{4}$   
 $.24\dot{7} = .247247247247\dot{2}$   
 $.6\dot{7} = .676767676767\dot{6}$
- Ex. 5.  $1.2\dot{4} = 1.24124124124124\dot{4}$   
 $.057\dot{8} = .0578578578578578\dot{5}$   
 $.4 = .4444444444444444\dot{4}$   
 $.47\dot{3}214\dot{7} = .4732147321473214\dot{7}$
- Ex. 6.  $.7 = .777777777777\dot{7}$   
 $.456\dot{7} = .456777777777\dot{7}$   
 $.2\dot{4} = .242424242424\dot{2}$   
 $.34678\dot{9} = .346789467894\dot{6}$

(141, 142)

$$\begin{array}{ll}
 \text{Ex. 7. } .\dot{8} & = .\dot{8}888888888888888888 \\
 .\dot{3}\dot{6} & = .\dot{3}63636363636363636 \\
 .\dot{4}85\dot{7} & = .\dot{4}857485748574857485\dot{7} \\
 .\dot{3}456\dot{7} & = .\dot{3}456734567345673456\dot{7} \\
 .\dot{2}78467894\dot{3} & = .\dot{2}784678943278467894\dot{3}
 \end{array}$$


---

## ADDITION AND SUBTRACTION.

(242, page 143.)

$$\begin{array}{r}
 \text{Ex. 1. } 2.4\dot{4}4444\dot{4} \\
 .3\dot{2}3232\dot{3} \\
 .5\dot{6}7567\dot{5} \\
 7.0\dot{5}6565\dot{6} \\
 4.3\dot{7}7777\dot{7} \\
 \hline
 14.7\dot{6}9587\dot{7}, \text{ Ans.}
 \end{array}$$

$$\begin{array}{r}
 \text{Ex. 2. } .4\dot{7}878787878\dot{7}8 \\
 .3\dot{2}1321321321\dot{3} \\
 .7\dot{8}5648564856\dot{4} \\
 .3\dot{2}222222222\dot{2} \\
 .5\dot{5}555555555\dot{5} \\
 .4\dot{3}2643264326\dot{4} \\
 \hline
 2.8\dot{9}6178807069\dot{8}, \text{ Ans.}
 \end{array}$$

$$\begin{array}{r}
 \text{Ex. 3. } .7\dot{8}5485\dot{4} \\
 .5\dot{9}5959\dot{5} \\
 \hline
 .189525\dot{8}, \text{ Ans.}
 \end{array}$$

$$\begin{array}{r}
 \text{Ex. 4. } 57.0\dot{5}8\dot{7} \\
 27.\dot{3}13\dot{1} \\
 \hline
 29.7\dot{4}5\dot{5}, \text{ Ans.}
 \end{array}$$

$$\begin{array}{r}
 \text{Ex. 5. } .\dot{5}\dot{5} \\
 .\dot{3}\dot{2} \\
 .\dot{1}\dot{2} \\
 \hline
 .\dot{9}\dot{9}=1, \text{ Ans.}
 \end{array}$$

$$\begin{array}{r}
 \text{Ex. 6. } .43\dot{8}\dot{7} \\
 .86\dot{3}\dot{3} \\
 .21\dot{1}\dot{1} \\
 .35\dot{5}\dot{4} \\
 \hline
 1.86\dot{8}\dot{6}=1.8\dot{6}, \text{ Ans.}
 \end{array}$$



Ex. 7.  $3.6\dot{5}3753\dot{7}$

$3.1\dot{3}5135\dot{1}$

$2.5\dot{6}4646\dot{4}$

$.5\dot{3}5353\dot{5}$

---

$9.888888\dot{8}=9.\dot{8}, \text{ Ans.}$

Ex. 8.  $.4\dot{3}24\dot{3}$

$.25000$

---

$.1824\dot{3}, \text{ Ans.}$

Ex. 9.  $7.24\dot{5}74$

$2.6346\dot{3}$

---

$4.6111\dot{1}=4.6\dot{1}, \text{ Ans.}$

Ex. 10.  $.99000$

$.4\dot{3}34\dot{3}$

---

$\text{Ans. } .5565\dot{6}$

Ex. 11.  $4.6\dot{3}863\dot{8}$

$8.31831\dot{8}$

$.01601\dot{6}$

$.54545\dot{4}$

$.45454\dot{5}$

---

$13.97297\dot{2}=13.97\dot{2}=13\frac{972}{999}=13\frac{36}{37}, \text{ Ans.}$

Ex. 12.  $.4\dot{4}$

$.2\dot{3}$

---

$.2\dot{1}=\frac{21}{99}=\frac{7}{33}, \text{ Ans.}$

## MULTIPLICATION AND DIVISION.

(244, page 144.)

Ex. 1.  $3.4=\frac{34}{10}; \dot{7}2=\frac{72}{99}; \frac{34}{10} \times \frac{72}{99}=\frac{136}{55}=2.4\dot{7}2, \text{ Ans.}$

Ex. 2.  $.04\dot{3}2=\frac{432}{9990}; \frac{432}{9990} \times \frac{18}{1}=\frac{144}{185}=.778\dot{3}, \text{ Ans.}$

Ex. 3.  $.15\dot{4}=\frac{154}{999}; .2=\frac{2}{9}; \frac{154}{999} \times \frac{2}{9}=\frac{77}{111}=.69\dot{3}, \text{ Ans.}$

Ex. 4.  $4.572\dot{4}=\frac{45724}{9999}; .7=\frac{7}{9};$   
 $\frac{45724}{9999} \times \frac{7}{9}=\frac{6532}{1111}=5.879\dot{3}, \text{ Ans.}$

Ex. 5.  $4.3\dot{7}=\frac{394}{90}; .27=\frac{27}{100}; \frac{394}{90} \times \frac{27}{100}=1.182, \text{ Ans.}$

Ex. 6.  $56.\dot{6}=\frac{510}{9}; \frac{510}{9} \times \frac{17}{137}=\frac{170}{411}=.4136253\dot{0}, \text{ Ans.}$

Ex. 7.  $\frac{428571}{999999} \times \frac{99}{54}=\frac{11}{14}=.785714\dot{2}, \text{ Ans.}$

Ex. 8.  $\frac{711285}{999999} \times \frac{27}{99}=\frac{21645}{111111}=.19480\dot{5}, \text{ Ans.}$

$$\text{Ex. 9. } 3.45\dot{6} = \frac{3111}{900} ; .42\dot{5} = \frac{383}{900} ;$$

$$\frac{3111}{900} \times \frac{383}{900} = \frac{397171}{270000} = 1.47100\dot{3}7, \text{ Ans.}$$

$$\text{Ex. 10. } 9.\dot{1}704\dot{5} = \frac{917045}{99999} ; 3.\dot{3}6 = \frac{333}{99} ;$$

$$\frac{917045}{99999} \times \frac{333}{99} = \frac{10087495}{3699963} = 2.7263\dot{7}, \text{ Ans.}$$

$$\text{Ex. 11. } \frac{24}{99} \times \frac{57}{99} = \frac{152}{1089} = .139577594123048668503\dot{2}, \text{ Ans.}$$

## UNITED STATES MONEY.

## NOTATION AND NUMERATION.

(250, page 146.)

$$\text{Ex. 2. } \text{Ans. } \$4.07$$

$$\text{Ex. 3. } \text{Ans. } \$10.04$$

$$\text{Ex. 4. } \text{Ans. } \$16.004$$

$$\text{Ex. 5. } \text{Ans. } \$.31\frac{1}{2}, \text{ or } \$.315$$

$$\text{Ex. 7. } \text{Ans. } \$1000.011$$

$$\text{Ex. 8. } \text{Ans. } \$32.584$$

$$\text{Ex. 9. } \text{Ans. } \$.06\frac{1}{4}, \text{ or } \$.0625$$

Ex. 10 Twenty-one dollars eighteen cents; one hundred sixty-four dollars five cents; seven dollars ninety cents; ten dollars one cent; two hundred one dollars twenty cents one mill; five dollars thirty-seven and one-half cents; eighty-one and one-fourth cents; fifteen dollars eight and one-third cents; ninety-six dollars five mills.

## OPERATIONS IN UNITED STATES MONEY.

(252, page 147.)

$$\text{Ex. 1. } \$3475.50$$

$$\text{Ex. 2. } \$4.62\frac{1}{2}$$

$$310.20$$

$$1.75$$

$$1287.375$$

$$.87\frac{1}{2}$$

$$207.125$$

$$1.00$$

$$.62\frac{1}{2}$$

$$\underline{\hspace{1cm}} \\ \$5280.20, \text{ Ans.}$$

$$\underline{\hspace{1cm}} \\ \$8.87\frac{1}{2}, \text{ Ans.}$$

Ex 3. \$390.375

$$\begin{array}{r} \underline{\$150.000} \end{array}$$

$$175.84$$

$$62.50$$

$$\underline{\$ 2.035, \text{ Ans.}}$$

Ex. 4. \$3800

$$190.87\frac{1}{2}$$

$$\underline{\$3990.87\frac{1}{2}, \text{ Ans}}$$

Ex. 5. \$50.000

$$\underline{\$10.75}$$

$$5.50$$

$$2.375$$

$$.875$$

$$.625$$

$$\underline{\$29.875, \text{ Ans.}}$$

Ex. 6. \$ .375  $\times$  150 = \$56.25

$$3.875 \times 4 = 15.50$$

$$\underline{\$71.75}$$

$$\$ .06\frac{1}{2} \times 84 = 5.25$$

$$.62\frac{1}{2} \times 25 = 15.62\frac{1}{2}$$

$$5.87\frac{1}{2} \times 2 = 11.75$$

$$\underline{\$39.12\frac{1}{2}, \text{ Ans}}$$

Ex. 7. \$31.25  $\times$  126.25 = \$3945.31 $\frac{1}{4}$

$$33.75 \times 138.25 = 4665.93\frac{1}{4}$$

$$\underline{\$8611.25}$$

$$\$8611.25 - \$6726 = \$1885.25, \text{ Ans.}$$

Ex. 8. \$.80  $\times$  28 $\frac{1}{2}$   $\times$  40 = \$ 912.

$$.11\frac{1}{2} \times 29 \times 300 = 1000.50$$

$$3.87\frac{1}{2} \times 36\frac{1}{4} \times 20 = 2809.37\frac{1}{2}$$

$$.06\frac{1}{4} \times 30\frac{1}{2} \times 112 = 213.50$$

$$\underline{\$11000} \quad - \$4935.37\frac{1}{2} = \$6064.62\frac{1}{2}, \text{ Ans}$$

Ex. 9. \$2189.25  $\div$  139 = \$15.75, *Ans.*

Ex. 10. \$44.748  $\div$  396  $\times$  \$.113, *Ans.*

Ex. 11. \$4.50  $\times$  10.75 = \$48.375;

$$\$48.375 \div 7.74 = \$6.25, \text{ Ans.}$$

Ex. 12. \$4885.80  $\div$  \$287.40 = 17, *Ans.*

Ex. 13.  $\$3.75 + \$2.875 = \$6.625$ , cost of a calf and a sheep;  
 $\$265 \div \$6.625 = 40$ , *Ans.*

Ex. 14. 
$$\begin{array}{r|l} & 128 \\ 9632 & 1730.75 \\ \hline & 23, \text{Ans.} \end{array}$$

Ex. 15. 
$$\begin{array}{r|l} & 125 \\ 41.25 & 112.20 \\ 2.5 & \\ \hline & 136, \text{Ans.} \end{array}$$

Ex. 16.  $\$2475.36 - \$1936.40 = \$538.96$ , the amount his money has *diminished* since the beginning of the month, which, by the conditions, must be  $\frac{5}{5} - \frac{3}{5} = \frac{2}{5}$  of what he had at the beginning of the month. Hence,  $\$538.96 \div \frac{2}{5} = \$1347.40$ , *Ans.*

Ex. 17.  $\$3200 - \$138 \times 12 = \$1544$ , saves yearly;  
 $\$1544 \times 8 = \$12352$ , *Ans.*

Ex. 18.  $\$45.75 \times 120 = \$5490$ ;  $\$5490 - \$1026 = \$4464$ ;  
 $\$4464 \div 120 = \$37.20$ , *Ans.*

Ex. 19.  $\$6.25 \times 425 = \$2656.25$ ;  
 $\$3088.25 - \$2656.25 = \$432$ ;  $\$432 \div \$4.50 = 96$ ;  
 $425 + 96 = 521$  barrels, *Ans.*

Ex. 20.  $\$6315.12 \div 36 = \$175.42$ , wages for 1 engineer;  
 $\$21927.50 \div \$175.42 = 125$ , *Ans.*

Ex. 21.  $\$2538 + \$750 - \$1378.56 = \$1909.44$ , *Ans.*

Ex. 22.  $\$1.875 \times 22 = \$41.25$ ;  $\$41.25 - \$25.75 = \$15.50$ ;  
 $\$1116 \div \$15.50 = 72$  months;  $72 \div 12 = 6$  years, *Ans.*

Ex. 23.  $(\$453.75 \div 27.5) + \$3.625 = \$20.125$ , *Ans.*

Ex. 24.  $\$.95 + \$1.37 + \$.73 = \$3.05$ , cost of 1 bushel of each kind;  
 $\$70.15 \div \$3.05 = 23$  bushels of each kind;  
 $23 \times 3 = 69$  bushels, *Ans.*

Ex. 25.  $375.5 \div 2 = 187.75$ ;  $\$1032.625 \div 187.75 = \$5.50$ , profit per acre;  
 $\$22.25 + \$5.50 = \$27.75$ , *Ans.*

Ex. 26.  $\$11.37\frac{1}{2} = \$\frac{91}{8}$

$$\begin{array}{r|l} 8 & \$91 \\ 7 & 2 \\ 8 & 161 \\ \hline 32 & 2093 \end{array}$$

\$65.40 $\frac{5}{8}$ , Ans.

Ex. 27.  $\$46.75 = \$\frac{187}{4}$

$$\begin{array}{r|l} 4 & 3 \\ 51 & 8 \\ 4 & 187 \\ \hline 2 & 11 \end{array}$$

5.5 hundred pounds.

Ex. 28.  $\$62.50 - (\$3.25 \times 12\frac{1}{2}) = \$21.875$ ;  
 $\$21.875 \div \$1.25 = 175$  pounds, Ans.

Ex. 29.  $\$10.04 \div 16 = \$.6275$ ;  $\$17.50 \div 20 = \$.875$ ;  
 $\$.875 - \$.6275 = \$.2475$ ;  
 $\$.2475 \times 320 = \$79.20$ , Ans.

## PROBLEMS

INVOLVING THE RELATION OF PRICE, COST, AND QUANTITY.

(257, page 151.)

Ex. 1.  $\$1.32 \times 187 = \$246.84$ , Ans.

Ex. 2.  $\$ \frac{3}{16} \times 70\frac{1}{2} \times 5 = \$66.09\frac{3}{8}$ , Ans.

Ex. 3.  $\$501.875 \div 365 = \$1.375$ , Ans.

Ex. 4.  $\$18.48 \div \$.105 = 176$ , Ans.

Ex. 5.  $\$17.75 \div 2 = \$8.875$ ;  
 $\$8.875 \times .1625 \times 140 = \$201.906\frac{1}{4}$ , Ans.

Ex. 6.  $\$16.50 \times 32.40 = \$534.60$ , Ans.

Ex. 7.  $\$66.44 \times 842.75 = \$55992.31$ , Ans.

Ex. 8.  $\$10660.125 \div 325.5 = \$32.75$ , Ans.

Ex. 9.  $\$1.94 \times 8.40 = \$16.296$ ;  $\$12.50 \times 1.262 = \$15.775$ ;  
 $\$16.296 + \$15.775 = \$32.071$ , Ans.

Ex. 10.  $\$37.6875 \div \$1.50 = 25.125 = 25\frac{1}{8}$  bushels, Ans.



Ex. 11.  $\$3.875 \div 2 = \$1.9375$ ;

$\$1.9375 \times 2.172 = \$4.208\frac{1}{4}$ , *Ans.*

Ex. 12.  $\$.37\frac{1}{2} = \$.3\frac{3}{8}$ ;  $\$.3\frac{3}{8} \times \frac{5}{8} \times \frac{456}{1} = \$106.87\frac{1}{2}$ , *Ans.*

Ex. 13.  $\$81.25 \div 32.5 = \$2.50$ , *Ans.*

Ex. 14.  $\$9.375 \times 24.240 = \$227.25$ , *Ans.*

Ex. 15.  $\$4234\frac{3}{8} \div \$5\frac{5}{8} = 752\frac{7}{8}$ , *Ans.*

Ex. 16.  $\$20.25 \times .972 = \$19.683$

$2.875 \times 15.75 = 45.281\frac{1}{4}$

$7.50 \times 8.756 = 65.670$

---

$\$130.634\frac{1}{4}$ , *Ans.*

Ex. 17.  $\$4.625 \times 10.46 = \$48.37\frac{3}{4}$ , *Ans.*

Ex. 18.  $\$4.70 \div 2 = \$2.35$ ;  $\$5.25 \div 2 = \$2.62\frac{1}{2}$ ;

$\$2.35 \times 5.840 = \$13.724$

$2.62\frac{1}{2} \times 4.376 = 11.487$

---

$\$25.211$ , *Ans.*

Ex. 19.  $\$2 \div \$2.50 = \frac{4}{5}$  yards, *Ans.*

Ex. 20.  $\$5.75 \times 37 = \$212.75$ , *Ans.*

Ex. 21.  $\$.96 \times 38.40 = \$36.864$ , *Ans.*

Ex. 22.  $\$2.875 \times 27\frac{2}{3} \times 9 = \$715.87\frac{1}{2}$ , *Ans.*

Ex. 23.  $\$80.745 \div \$.42 = 192\frac{1}{4}$  pounds, *Ans.*

Ex. 24.  $\$15.50 \times .327 = \$ 5.0685$

$1.625 \times 6.72 = 10.92$

$4.25 \times 1.108 = 4.709$

---

$\$20.6975$ , *Ans.*

Ex. 25.  $\$15\frac{3}{4} \div \$.7 = 18$ , *Ans.*

Ex. 26.  $\$5 \times 18.962 = \$94.81$ , *Ans.*

Ex. 27.  $\$27.90 \div 15.5 = \$1.80$ , *Ans.*

Ex. 28.  $\$125.38 \times 27.86 = \$3493.0868$ , *Ans.*

Ex. 29.  $\$13.125 \div .7 = \$18.75$ , *Ans.*

Ex. 30.  $\$12.75 \div 2 = \$6.375$ ;  $\$15.50 \div 2 = \$7.75$ ;

$\$6.375 \times .720 = \$4.59$

$\$7.75 \times .912 = 7.068$

---

$\$11.658$ , *Ans.*

---

LEDGER ACCOUNTS.

(258, page 153)

Ex. 1. *Ans.*  $\$3434.80$

Ex. 2. *Ans.*  $\$7222.55$

Ex. 3. *Ans.*  $\$73785.18$

Ex. 4. *Ans.*  $\$750026.82$

---

ACCOUNTS AND BILLS.

(267, page 155.)

Ex. 1.

$\$2.85 \times 10 = \$28.50$

$1.12\frac{1}{2} \times 16 = 18.00$

$.14 \times 72 = 10.08$

$.16\frac{1}{2} \times 42 = 6.93$

$.40 \times 12 = 4.80$

$.56 \times 24\frac{1}{2} = 13.72$

---

*Ans.*  $\$82.03$

Ex. 2.

$\$1.25 \times 125 = \$156.25$

$1.75 \times 275 = 481.25$

$1.12\frac{1}{2} \times 180 = 202.50$

$.87\frac{1}{2} \times 210 = 183.75$

$.84 \times 80 = 67.20$

$.90 \times 95 = 85.50$

$1.06 \times 175 = 185.50$

$30.50 \times 8 = 244.00$

$35.75 \times 3 = 107.25$

$.10\frac{1}{2} \times 958 = 100.59$

$.37\frac{1}{2} \times 40 = 15.00$

---

*Ans.*  $\$1828.79$

Ex. 3. \$27 50  $\times 40 =$  \$1100.00

19.20  $\times 25 =$  480.00

48.10  $\times 16 =$  769.60

17.75  $\times 12 =$  213.00

26.30  $\times 20 =$  526.00

31.85  $\times 15 =$  477.75

3.87 $\frac{1}{2}$   $\times 36 =$  139.50

4.12 $\frac{1}{2}$   $\times 42 =$  173.25

2.90  $\times 25 =$  72.50

---

3 \$951.60, *Ans.*

Ex. 4. \$6.25  $\times 150 =$  \$937.50

7.16  $\times 275 =$  1969.00

5.87 $\frac{1}{2}$   $\times 170 =$  998.75

1.62 $\frac{1}{2}$   $\times 326 =$  529.75

.82  $\times 214 =$  175.48

.91  $\times 300 =$  273.00

1.06  $\times 500 =$  530.00

---

\$5413.48, *Ans.*

*Dr.*

*Cr.*

Ex. 5. \$64.30  $\times 24 =$  \$1543.20    \$17.60  $\times 20 =$  \$352.00

10.25  $\times 15 =$  153.75    3.12 $\frac{1}{2}$   $\times 50 =$  156.25

7.78  $\times 7 =$  54.46    9.37 $\frac{1}{2}$   $\times 42 =$  393.75

8.45  $\times 25 =$  211.25    1000.00

16.12 $\frac{1}{2}$   $\times 14 =$  225.75    3.10  $\times 75 =$  232.50

5.90  $\times 27 =$  159.30    .87 $\frac{1}{2}$   $\times 36 =$  31.50

.09 $\frac{1}{2}$   $\times 1840 =$  174.80

---

\$2522.51

---

\$2166.00

2522.51

---

Balance, \$356.51

	<i>Dr.</i>	<i>Cr.</i>
Ex. 6.	\$ .23 × 896 = \$206.08	\$2.25 × 61 = \$137.25
	.09 $\frac{1}{4}$ × 872 = 80.66	.22 × 70 = 15.40
	.11 $\frac{3}{8}$ × 481 $\frac{1}{2}$ = 54.77	.87 $\frac{1}{2}$ × 56 = 49.00
	.13 $\frac{1}{2}$ × 509 $\frac{3}{4}$ = 68.82	.68 $\frac{3}{4}$ × 31 = 21.31
	.16 $\frac{2}{3}$ × 81 = 13.50	
	1.40 × 15 = 21.00	
	.12 $\frac{1}{2}$ × 963 $\frac{3}{8}$ = 120.42	
	<hr/>	<hr/>
	\$565.25	\$222.96
		565.25
		<hr/>
		Note to Bal., \$342.29

## PROMISCUOUS EXAMPLES.

Ex. 1.  $\$4.875 \times 12\frac{5}{8} = \$61.54 +$ , *Ans.*

Ex. 2.  $\$33.75 \div \$.375 = 90$ ;  $90 \div 2\frac{1}{2} = 36$ , *Ans.*

Ex. 3.  $36 \times 36 = 1296$ ;  $\$97.20 \div 1296 = \$.075$ , *Ans.*

Ex. 4.  $\$5.35 \div .625 = \$8.56$ , *Ans.*

Ex. 5.  $.0\frac{1}{3} = .033\frac{1}{3}$

$.00\frac{5}{6} = .008\frac{1}{3}$

---

Or,  $\frac{1}{30} - \frac{5}{600} = \frac{1}{40} = .025$ , *Ans.*

.025, *Ans.*

Ex. 6.  $814\frac{99}{200} \times 26\frac{15}{32} = 814.495 \times 26.46875$   
 $= 21558.66 +$ , *Ans.*

Ex. 7.  $\$75 \times 5 = \$375$ ;  $\$68 \times 12 = \$816$ ;  $5 + 12 = 17$ ;  
 $\$375 + \$816 + \$118 = \$1309$ ;  
 $\$1309 \div 17 = \$77$ , *Ans.*

Ex. 8.  $\$.625 \times .8 = \$.50$ , *Ans.*

Ex. 9.  $\$.87\frac{1}{2} + \$.18\frac{3}{4} + \$.10\frac{1}{4} = \$1.165$ ;  
 $\$27.96 \div \$1.165 = 24$ , *Ans.*

Ex. 10.  $13543.47 \div 365.25 = 37.08$  miles in 1 day;

$$37.08 \times \frac{7}{8} = 32.445 \text{ miles, } Ans.$$

Ex. 11.  $\$5.12\frac{1}{2} \times 100 = \$512.50$        $\$6.50 \times 75 = \$487.50$

$$1.06\frac{1}{4} \times 250 = 265.62\frac{1}{2} \quad 1.37\frac{1}{2} \times 250 = 343.75$$

$$\underline{221.87\frac{1}{2}}$$

$$\underline{\$831.25}$$

$$\$1000.00 - \$831.25 = \$168.75, \text{ to be}$$

realized on the remaining 25 barrels of flour; hence

$$\$168.75 \div 25 = \$6.75, \text{ } Ans.$$

Ex. 12.  $4580.289 \div 114.45 = 40.02$  bushels from 1 acre;

$$120.06 \div 40.02 = 3 \text{ acres, } Ans.$$

Ex. 13.  $.017226 \div .030625 = .5625 \pm, \text{ } Ans.$

Ex. 14.  $13.5 \div .0225 = 600, \text{ } Ans.$

Ex. 15.  $8.5 \div 5 = 1.7$  rods, his daily work;

$$59.5 - 8.5 = 51; 51 \div 1.7 = 30 \text{ days, } Ans.$$

Ex. 16.  $\$.375 \times 28.5 = \$10.68\frac{3}{4}; 12520 \div 2000 = 6.26 \text{ tons;}$

$$.75 \times 4.53 = \underline{3.39\frac{3}{4}}$$

$$\$14.085 \div 6.26 = \$2.25, \text{ } Ans.$$

Ex. 17.  $1826 + 1478 + 1921 = 5225; \$8.80 \div 2 = \$4.40;$

$$\$4.40 \times 5.225 = \$22.99 \quad \$.09 \times 31 = \$2.79$$

$$5.25 \times 2.81 = 14.75\frac{1}{4} \quad 4.50 \times 6\frac{1}{2} = 29.25$$

$$\underline{\$37.74\frac{1}{4}}$$

$$- \$32.04 = \$5.70\frac{1}{4}, \text{ } Ans.$$

Ex. 18.  $\$122.50 \div 35 = \$3.50; \$3.50 \times 29 = \$101.50, \text{ } Ans.$

Ex. 19.  $\$.56\frac{1}{4} \times 1200 = \$675$

$$168.675$$

$$\underline{\$843.675}$$

$$\$60 \times 375.5 = 225.30$$

$$1200 - 375.5 = 824.5;$$

$$\underline{\$618.375 \div 824.5 = \$.75, \text{ } Ans.}$$



$$\begin{array}{r|l} \text{Ex. 20.} & \$2.856 \\ 1680 & 2000 \end{array}$$

\$3.40, *Ans.*

$$\begin{array}{r|l} \text{Ex. 21.} & 8 \\ .125 & 25.42 \end{array}$$

\$3228.34, *Ans.*

Ex. 22.  $(\$100 \times 150) - \$3900 = \$11100$ , cost of whole;  
 $\$11100 \div 150 = \$74$ , cost per acre;  
 $\$11100 - \$2250 = \$8850$ , sold for;  
 $\$8850 \div 150 = \$59$ , sold for, per acre.

Ex. 23.  $\$14.375 \times 212.5 = \$3054.68\frac{3}{4}$ , cost;  
 $1.75 \times 2125 = \$3718.75$ , avails;  
 $\$664.06\frac{1}{4}$ , *Ans.*

Ex. 24.  $\$545 \div 10 = \$54.50$ , cost of 1 acre;  
 $\$17712.50 \div \$54.50 = 325$ , *Ans.*

Ex. 25.  $224.56 \times 7 \times \frac{1}{2} \times \frac{1}{4} = 196.49$ , *Ans.*

Ex. 26.  $\$169.8125 - \$39.1875 = \$130.625$ ;  
 $\$130.625 \div 104.5 = \$1.25$ , *Ans.*

Ex. 27.  $\$6.975 \div .93 = \$7.50$ , *Ans.*

Ex. 28.  $\$4000 \times .375 \times .12 = \$180$ , *Ans.*

Ex. 29.  $\left\{ \frac{1\frac{3}{4}}{4\frac{1}{2}} \div \frac{2\frac{1}{3}}{2\frac{1}{4}} \right\} \times \frac{4}{5} \times \frac{1}{2} = \frac{7}{4} \times \frac{2}{9} \times \frac{9}{4} \times \frac{3}{7} \times \frac{4}{5} \times \frac{1}{2}$   
 $= \frac{3}{20} = .15$ , *Ans.*

Ex. 30.  $\$.33\frac{1}{3} \times 375 = \$125$ ;  $\$125 \div 7.5 = \$16.66\frac{2}{3}$ , *Ans.*

Ex. 31.  $1 + .84 = 1.84$  times the sum invested;  
 $1.84 \times 2 = 3.68$  times the sum invested, *Ans.*

Ex. 32.  $\frac{3}{10} = .3$ ;  $\frac{3}{5} = .6$ ;  $1 - (.3 + .6) = .1$ . Now, if he purchases .3 of a bushel of barley, .6 of a bushel of wheat, and .1 of a bushel of oats, he will have 1 bushel of grain, worth

$$\$ .625 \times .3 = \$ .1875$$

$$.1875 \times .6 = 1.125$$

$$.375 \times .1 = .0375$$

$$\underline{\$1.35}$$

And for \$54, he can purchase as many bushels as \$1.35 is contained times in \$54. Therefore,

$$\$54 \div \$1.35 = 40, \text{ Ans.}$$

Ex. 33.  $19\frac{1}{3} \times 27 = 522$  yards;

$$\$4.31\frac{1}{4} \times 522 = \$2251.12\frac{1}{2}$$

$$381.87\frac{1}{2}$$

$$9.62\frac{1}{2}$$

---


$$\$2642.62\frac{1}{2} \div 522 = \$5.06\frac{1}{4}, \text{ Ans.}$$

Ex. 34.  $\$1.18\frac{3}{4}$  1356

$\$.41$  736

$1.12\frac{1}{2}$  870

$.31$  528

---


$$\$ .06\frac{1}{4} \times 486 = \$30.37\frac{1}{2}; \quad \$.10 \times 208 = \$20.80;$$

$$\$30.37\frac{1}{2} + \$20.80 + \$13.62\frac{1}{2} = \$64.80, \text{ entire loss;}$$

$$\$235.87\frac{1}{2} - \$64.80 = \$171.07\frac{1}{2}, \text{ gained, Ans.}$$

Ex. 35.  $\frac{125}{176} + \frac{116}{704} = \frac{7}{8}; \frac{7}{8} \div 2 = \frac{7}{16}, \text{ greater;}$

$$\frac{125}{176} - \frac{116}{704} = \frac{6}{11}; \frac{6}{11} \div 2 = \frac{3}{11}, \text{ less.}$$

Ex. 36.  $1 + \frac{4}{9} = \frac{13}{9}$  times his original capital, end of 1st year;

$$\frac{13}{9} \times \frac{4}{5} = \frac{52}{45} \quad " \quad " \quad " \quad " \quad " \quad 2d \quad "$$

$$\frac{52}{45} \times 1\frac{3}{8} = \frac{143}{90} \quad " \quad " \quad " \quad " \quad " \quad 3d \quad "$$

$$\$28585.70 \div \frac{143}{90} = \$17991, \text{ his original capital;}$$

$$\$28585.70 - \$17991 = \$10594.70, \text{ gain, Ans.}$$

## CONTINUED FRACTIONS.

(271, page 162.)

The division may be performed in the same manner as in finding the greatest common divisor. (See 150, Higher Arithmetic.)

## Ex. 2.

		6721	$\frac{1}{\text{Ans.}}$
1240	5	6200	$\frac{5+1}{\text{Ans.}}$
1042	2	521	$\frac{2+1}{\text{Ans.}}$
198	2	396	$\frac{2+1}{\text{Ans.}}$
125	1	125	$\frac{1+1}{\text{Ans.}}$
73	1	73	$\frac{1+1}{\text{Ans.}}$
52	1	52	$\frac{1+1}{\text{Ans.}}$
21	2	42	$\frac{2+1}{\text{Ans.}}$
20	2	10	$\frac{2+1}{\text{Ans.}}$
1	10	10	$\frac{10}{\text{Ans.}}$

## Ex. 3.

		516901	$\frac{1}{\text{Ans.}}$
223874	2	447748	$\frac{2+1}{\text{Ans.}}$
207459	3	69153	$\frac{3+1}{\text{Ans.}}$
16415	4	65660	$\frac{4+1}{\text{Ans.}}$
13972	4	3493	$\frac{4+1}{\text{Ans.}}$
2443	1	2443	$\frac{1+1}{\text{Ans.}}$
2100	2	1050	$\frac{2+1}{\text{Ans.}}$
343	3	1029	$\frac{3+1}{\text{Ans.}}$
336	16	21	$\frac{16+1}{\text{Ans.}}$
7	3	21	$\frac{3}{\text{Ans.}}$

Ex. 4.			121	1
	29	4	116	<i>Ans.</i> $\frac{1}{4+1}$
	25	5	5	$\frac{5+1}{1+1}$
	4	1	4	$\frac{1+1}{-}$
	4	4	1	4

(273, page 163.)

- Ex. 1. Terms of continued fraction,  $\frac{1}{2}, \frac{1}{3}, \frac{1}{5}, \frac{1}{4}$ ;  
approximate values,  $\frac{1}{2}, \frac{3}{7}, \frac{16}{37}, \frac{67}{155}$ , *Ans.*
- Ex. 2. Terms of continued fraction,  $\frac{1}{4}, \frac{1}{4}, \frac{1}{1}, \frac{1}{7}, \frac{1}{2}$ ;  
approximate values,  $\frac{1}{4}, \frac{4}{17}, \frac{5}{21}, \frac{39}{164}, \frac{83}{349}$ , *Ans.*
- Ex. 3. Terms of continued fraction,  $\frac{1}{7}, \frac{1}{5}, \frac{1}{4}$ ;  
approximate values,  $\frac{1}{7}, \frac{5}{36}, \frac{21}{151}$ , *Ans.*
- Ex. 4. Terms of continued fraction,  $\frac{1}{3}, \frac{1}{4}, \frac{1}{2}, \frac{1}{4}, \frac{1}{1}$ ;  
approximate values,  $\frac{1}{3}, \frac{4}{13}, \frac{9}{29}, \frac{40}{129}, \frac{49}{158}$ , *Ans.*
- Ex. 5. Terms of continued fraction,  $\frac{1}{1}, \frac{1}{2}, \frac{1}{4}, \frac{1}{3}$ ;  
approximate values,  $1, \frac{2}{3}, \frac{9}{13}, \frac{29}{42}$ , *Ans.*

## COMPOUND NUMBERS

## REDUCTION DESCENDING.

(367, page 194.)

- Ex. 2. £133  $\times$  20 + 6 s. = 2666 s. ;  
2666 s.  $\times$  12 + 8 d. = 32000 d. ;  
32001 d.  $\times$  4 = 128000 far., *Ans.*

(162—194)

Ex. 3.  $100 \text{ mi.} \times 63360 = 6336000 \text{ in.}, \text{ Ans.}$

NOTE.—When the number given for reduction contains but one denomination, the scale of relation may be taken from the table of *Unit Equivalents*, and the answer obtained by a single operation.

Ex. 4.  $1\frac{1}{2} \text{ mi.} \times 4 = 6 \text{ mi.}, \text{ length of fence;}$   
 $6 \text{ mi.} \times 320 = 1920 \text{ rd.}, \text{ Ans.}$

Ex. 5.  $8 \times 3 \times 3 = 72 \text{ cu. ft.}, \text{ solid contents of the block;}$   
 $175 \text{ lb.} \times 72 = 12600 \text{ lb.}; 12600 \text{ lb.} \div 100 = 126 \text{ cwt.};$   
 $126 \text{ cwt.} \div 20 = 6 \text{ T. } 6 \text{ cwt.}, \text{ Ans.}$

Ex. 6.  $1 \text{ hhd.} = 63 \text{ gal.}; \$ .28 \times 63 = \$17.64, \text{ Ans.}$

Ex. 7.  $1548 \text{ bu. } 1 \text{ pk.} = 6193 \text{ pk.}; 2 \text{ bu. } 3 \text{ pk.} = 11 \text{ pk.};$   
 $6193 \div 11 = 563, \text{ Ans.}$

Ex. 8.  $\$3.75 \times 10 = \$37.50; 10 \text{ bu.} = 640 \text{ pt.};$   
 $\$.06\frac{1}{4} \times 640 = \$40.00; \$40 - \$37.50 = \$2.50, \text{ Ans.}$

Ex. 9.  $90^\circ \times 60 + 17' = 5417'; 5417' \times 60 + 40''$   
 $= 325060, \text{ Ans.}$

Ex. 10. The 18th century embraced the time from the commencement of A. D. 1701 to A. D. 1800 inclusive, and 1800 was not leap year; hence,  $100 \text{ yr.} \times 365 + 24 \text{ da.} = 36524 \text{ da.}, \text{ Ans.}$

Ex. 11.  $1 \text{ great-gross} = 1728 \text{ units}; \$.06\frac{1}{4} \times 1728 = \$108, \text{ Ans.}$

Ex. 12.  $4 \text{ bales } 4 \text{ bundles } 1 \text{ ream } 10 \text{ quires} = 990 \text{ quires};$   
 $24 \div 8 = 3 \text{ vol. per quire}; 990 \times 3 = 2970 \text{ vol.}, \text{ Ans.}$

Ex. 13.  $18 \text{ yr.} \times 365 + 24 \text{ da.} = 6594 \text{ da.};$   
 $6594 \text{ da.} \times 24 = 158256 \text{ h.};$   
 $158256 \text{ h.} \times 60 = 9495360 \text{ min.}, \text{ Ans.}$

Ex. 14.  $481 \text{ sov.} \times 240 = 115440 \text{ d.}, \text{ Ans.}$

Ex. 15.  $\$7\frac{3}{8} = \$7.375; \$7.375 \times 1000 = 7375 \text{ mills}, \text{ Ans.}$

Ex. 16.  $3 \text{ P.} \times 130 = 390 \text{ gal.}; 390 \text{ gal.} \times 4 = 1560 \text{ qt.}, \text{ Ans.}$



- Ex. 17.  $37 \text{ ells} \times 5 + 1 \text{ qr.} = 186 \text{ qr.};$   
 $186 \text{ qr.} \div 4 = 46 \text{ yd. } 2 \text{ qr., } \textit{Ans.}$
- Ex. 18.  $\text{£}6 \text{ } 10 \text{ s. } 10 \text{ d.} = 1570 \text{ d.};$   
 $\$.02\frac{1}{6} \times 1570 = \$31.66+, \textit{Ans.}$
- Ex. 19.  $6 \text{ O.} \times 16 + 14 \text{ f } \text{z} = 110 \text{ f } \text{z};$   
 $110 \text{ f } \text{z} \times 8 + 3 \text{ f } \text{z} = 883 \text{ f } \text{z};$   
 $883 \text{ f } \text{z} \times 60 + 45 \text{ m.} = 53025 \text{ m., } \textit{Ans.}$
- Ex. 20.  $1 \text{ T. } 1 \text{ P. } 1 \text{ hhd.} = 7 \text{ hhd.};$   
 $7 \text{ hhd.} \times 52\frac{1}{2} = 367\frac{1}{2} \text{ gal., } \textit{Ans.}$
- Ex. 21.  $\text{£}126 \text{ } 12 \text{ s. } 6 \text{ d.} = 30390 \text{ d.};$   
 $30390 \text{ d.} \div 60 = \$506\frac{1}{2}, \textit{Ans}$
- Ex. 22.  $1 \text{ hhd.} = 504 \text{ pt.}; 2 \text{ qt.} + 1 \text{ qt.} + 1 \text{ pt.} = 7 \text{ pt.};$   
 $504 \div 7 = 72, \textit{Ans.}$
- Ex. 23.  $2 \text{ ft. } 9 \text{ in.} = 33 \text{ in.}; 63360 \div 33 = 1920 \text{ steps in } 1$   
 $\text{mile}; 1920 \times 95 = 182400, \textit{Ans.}$
- Ex. 24.  $\$1\frac{3}{4} \times 12 = \$21, \text{ cost}; 12 \text{ bbl.} \times 126 = 1512 \text{ qt.};$   
 $\$.06 \times 1512 = \$90.72; \$90.72 - \$21 = \$69.72, \textit{Ans}$
- Ex. 25.  $75 \text{ A.} \times 10 + 4 \text{ sq. ch.} = 754 \text{ sq. ch.};$   
 $754 \text{ sq. ch.} \times 16 + 18 \text{ P.} = 12082 \text{ P.};$   
 $12082 \text{ P.} \times 625 + 118 \text{ sq. l.} = 7551368 \text{ sq. l., } \textit{Ans.}$
- Ex. 26.  $4 \text{ in.} \times 16 = 64 \text{ in., } \textit{Ans.}$
- Ex. 27.  $150 \text{ leagues} \times 3 \times 1.15 = 517.5 \text{ miles, } \textit{Ans.}$
- Ex. 28.  $(50 \text{ A.} - 14 \text{ A.}) \times 160 = 5760 \text{ sq. rd., } \textit{Ans.}$
- Ex. 29.  $36 \text{ lb. } 8 \text{ oz.} = 8800 \text{ pwt.};$   
 $\$1.042 \times 8800 = \$9169.60, \textit{Ans.}$
- Ex. 30.  $9 \text{ cwt. } 42 \text{ lb.} = 942 \text{ lb.};$   
 $942 \text{ lb.} \times 8 = 7536 \text{ lb.}; 7536 \div 48 = 157, \textit{Ans.}$
- Ex. 31.  $\$1\frac{1}{4} \times 12 = \$15, \text{ cost}; 12 \text{ bbl.} \times 280 = 3360 \text{ lb.};$   
 $\$.0075 \times 3360 = \$25.20;$   
 $\$25.20 - \$15 = \$10.20, \textit{Ans.}$

- Ex. 32. 1 lb. 10  $\bar{3}$  = 22 $\bar{3}$  = 10560 gr. = 1056 doses;  
 $\$2.25 \times 22 = \$49.50$ ;  $\$.12\frac{1}{2} \times 1056 = \$132$ ;  
 $\$132 - \$49.50 = \$82.50$ , *Ans.*

## (368, page 196.)

- Ex. 1.  $\frac{1}{300}$  lb.  $\times \frac{1^2}{1} \times \frac{2^0}{1} = \frac{4}{5}$  pwt., *Ans.*  
 Ex. 2.  $\frac{1}{672}$  hhd.  $\times \frac{6^3}{1} \times \frac{4}{1} \times \frac{2}{1} = \frac{3}{4}$  pt., *Ans.*  
 Ex. 3.  $\frac{1}{2112}$  mi.  $\times \frac{8}{1} \times \frac{4^0}{1} \times \frac{1^1}{2} = \frac{5}{6}$  yd., *Ans.*  
 Ex. 4.  $\frac{9}{342}$  gal.  $\times \frac{4}{1} \times \frac{2}{1} \times \frac{4}{1} = \frac{16}{19}$  gi., *Ans.*  
 Ex. 5.  $\frac{1}{5000} \times \frac{2}{3} \times \frac{3}{4} \times \frac{6}{11} \times \frac{2^2}{7}$  lb.  $\times \frac{1^6}{1} \times \frac{1^6}{1} = \frac{192}{4375}$  dr., *Ans.*  
 Ex. 6.  $\frac{\$}{18000} \times \frac{100}{1} = \$.00\frac{1}{180}$ , *Ans.*  
 Ex. 7.  $\frac{1}{45}$  P.  $\times \frac{2^5}{1} = \frac{5}{9}$  l., *Ans.*  
 Ex. 8.  $\frac{1}{35}$  D.  $\times \frac{2^0}{1} = \frac{4}{7}$  gr., *Ans.*  
 Ex. 9.  $\frac{6}{7} \times \frac{4}{11}$  rd.  $\times \frac{1^1}{2} = \frac{1^2}{7}$  yd., *Ans.*  
 Ex. 10.  $\frac{5}{18}$  wk.  $\times \frac{7}{1} \times \frac{9}{2} = 8\frac{3}{4}$  da., *Ans.*  
 Ex. 11.  $\frac{3}{1360} \times \frac{1^7}{4} \times \frac{2}{19}$  A.  $\times \frac{1^6}{1} = \frac{3}{19}$  sq. rd., *Ans.*

## (369, page 197.)

- Ex. 1.  $\frac{9}{10}$  yd.  $\times 3 = 2\frac{7}{10}$  ft.;  $\frac{7}{10}$  ft.  $\times 12 = 8\frac{2}{5}$  in.;  
*Ans.* 2 ft.  $8\frac{2}{5}$  in.  
 Ex. 2.  $\frac{4}{5}$  mo.  $\times 30 = 24$  da., *Ans.*  
 Ex. 3.  $\frac{607}{640}$  T.  $\times 20 = 18\frac{31}{2}$  cwt.;  $\frac{31}{2}$  cwt.  $\times 100 = 96\frac{7}{8}$  lb.;  
 $\frac{7}{8}$  lb.  $\times 16 = 14$  oz.,; *Ans.* 18 cwt. 96 lb. 14 oz.  
 Ex. 4.  $\frac{5}{9}$  T.  $\times 20 = 11\frac{1}{9}$  cwt.;  $\frac{1}{9}$  cwt.  $\times 4 = \frac{4}{9}$  qr.;  
 $\frac{4}{9}$  qr.  $\times 28 = 12\frac{4}{9}$  lb.;  $\frac{4}{9}$  lb.  $\times 16 = 7\frac{1}{9}$  oz.;  
*Ans.* 11 cwt. 12 lb.  $7\frac{1}{9}$  oz.  
 Ex. 5.  $\frac{3}{8} \times \frac{5}{2}$  lb.  $\times 12 = 11\frac{1}{4}$   $\bar{3}$ ;  $\frac{1}{4}$   $\bar{3} \times 8 = 2$   $\bar{3}$ ;  
*Ans.* 11  $\bar{3}$  2  $\bar{3}$ .

Ex. 6  $\frac{7}{13}$  A.  $\times 4 = 2\frac{2}{13}$  R.;  $\frac{2}{13}$  R.  $\times 40 = 6\frac{2}{13}$  P.;

$\frac{2}{13}$  P.  $\times 30\frac{1}{4} = 4\frac{17}{26}$  sq. yd.;

$\frac{17}{26}$  sq. yd.  $\times 9 = 5\frac{23}{26}$  sq. ft.;

$\frac{23}{26}$  sq. ft.  $\times 144 = 127\frac{5}{13}$  sq. in.;

*Ans.* 2 R. 6 P. 4 sq. yd. 5 sq. ft.  $127\frac{5}{13}$  sq. in.

Ex. 7.  $\frac{3}{7}$  mi.  $\times 8 = 3\frac{3}{7}$  fur.;  $\frac{3}{7}$  fur.  $\times 40 = 17\frac{1}{7}$  rd.;

$\frac{1}{7}$  rd.  $\times 16\frac{1}{2} = 2\frac{2\frac{1}{2}}{7}$  ft.;  $\frac{2\frac{1}{2}}{7}$  ft.  $\times 12 = 4\frac{2}{7}$  in.;

*Ans.* 3 fur. 17 rd. 2 ft.  $4\frac{2}{7}$  in.

Ex. 8.  $\frac{4}{7}$  great-gross  $\times 12 = 6\frac{6}{7}$  gross;  $\frac{6}{7}$  gross  $\times 12 = 10\frac{2}{7}$  doz.;

$\frac{2}{7}$  doz.  $\times 12 = 3\frac{3}{7}$  units; *Ans.* 6 gross 10 doz.  $3\frac{3}{7}$  units.

Ex. 9.  $\frac{9}{16}$  great circle  $\times 360 \times 60 = 12150$  mi., *Ans.*

Ex. 10.  $\frac{27}{8}$  Cd.  $\times \frac{4}{5} = 2\frac{7}{10}$  Cd.;  $\frac{7}{10}$  Cd.  $\times 8 = 5\frac{6}{10}$  cd. ft.;

$\frac{6}{10}$  cd. ft.  $\times 16 = 9\frac{3}{5}$  cu. ft.;

*Ans.* 2 Cd. 5 cd. ft.  $9\frac{3}{5}$  cu. ft.

Ex. 11.  $438$  mi.  $\times \frac{3}{5} = 262\frac{4}{5}$  mi.;  $\frac{4}{5}$  mi.  $\times 8 = 6\frac{2}{5}$  fur.;

$\frac{2}{5}$  fur.  $\times 40 = 16$  rd.; *Ans.* 262 mi. 6 fur. 16 rd.

Ex. 12.  $\frac{43}{96}$  f 3  $\times 8 = 3\frac{7}{12}$  f 3;  $\frac{7}{12}$  f 3  $\times 60 = 35$  m.;

*Ans.* 3 f 3 35 m.

Ex. 13.  $\frac{3}{7}$  S.  $\times 30 = 12\frac{6}{7}^\circ$ ;  $\frac{6}{7}^\circ \times 60 = 51\frac{3}{7}'$ ;  $\frac{3}{7}' \times 60 = 25\frac{5}{7}''$ ;

*Ans.*  $12^\circ 51' 25\frac{5}{7}''$ .

Ex. 14.  $\frac{7}{13}$  hhd.  $\times 63 = 33\frac{12}{13}$  gal.;  $\frac{12}{13}$  gal.  $\times 4 = 3\frac{9}{13}$  qt.;

$\frac{9}{13}$  qt.  $\times 2 = 1\frac{5}{13}$  pt.;  $\frac{5}{13}$  pt.  $\times 4 = 1\frac{7}{13}$  gi.;

*Ans.* 33 gal. 3 qt. 1 pt.  $1\frac{7}{13}$  gi.

(370, page 198.)

Ex. 1. .645 da.  $\times 24 = 15.48$  h.; .48 h.  $\times 60 = 28.8$  min.;

.8 min.  $\times 60 = 48$  sec.; *Ans.* 15 h. 28 min. 48 sec.

Ex. 2 .765 lb.  $\times 12 = 9.18$  oz.; .18 oz.  $\times 20 = 3.6$  pwt.;

.6 pwt.  $\times 24 = 14.4$  gr. *Ans.* 9 oz. 3 pwt. 14.4 gr.

(197, 198)

- Ex. 3.  $.6625 \text{ mi.} \times 8 = 5.3 \text{ fur.}$ ;  $.3 \text{ fur.} \times 40 = 12 \text{ rd.}$ ;  
*Ans.* 5 fur. 12 rd.
- Ex. 4.  $.8469^\circ \times 60 = 50.814'$ ;  $.814' \times 60 = 48.84''$ ;  
*Ans.* 50' 48.84".
- Ex. 5.  $.875 \text{ hhd.} \times 63 = 55.125 \text{ gal.}$ ;  $.125 \text{ gal.} \times 8 = 1 \text{ pt.}$ ;  
*Ans.* 55 gal. 1 pt.
- Ex. 6.  $\text{£}85251 \times 20 = 17.0502 \text{ s.}$ ;  $.0502 \text{ s.} \times 12 = .6024 \text{ d.}$ ;  
 $.6024 \text{ d.} \times 4 = 2.4096 \text{ far.}$ ; *Ans.* 17 s. 2.4 + far.
- Ex. 7.  $.715^\circ \times 60 = 42.9'$ ;  $.9' \times 60 = 54''$ ; *Ans.* 42' 54".
- Ex. 8.  $.88125 \text{ A.} \times 4 = 3.525 \text{ R.}$ ;  $.525 \text{ R.} \times 40 = 21 \text{ P.}$ ;  
*Ans.* 7 A. 3 R. 21 P.
- Ex. 9.  $.625 \text{ fath.} \times 6 = 3.75 \text{ ft.} = 3\frac{3}{4} \text{ ft.}$ , *Ans.*
- Ex. 10.  $.375625 \text{ bbl.} \times 200 = 75.125 \text{ lb.}$ ;  $.125 \text{ lb.} \times 16 = 2 \text{ oz.}$ ;  
*Ans.* 75 lb. 2 oz.
- Ex. 11.  $.1150390625 \text{ Cong.} \times 8 = .9203125 \text{ O.}$ ;  
 $.9203125 \text{ O.} \times 16 = 14.725 \text{ f } \frac{3}{4}$ ;  $.725 \text{ f } \frac{3}{4} \times 8 = 5.8 \text{ f } \frac{3}{4}$ ;  
 $8 \text{ f } \frac{3}{4} \times 60 = 48 \text{ m.}$ ; *Ans.* 14 f  $\frac{3}{4}$  5 f  $\frac{3}{4}$  48 m.
- Ex. 12.  $.61 \text{ tun} \times 2 = 1.22 \text{ P.}$ ;  $.22 \text{ P.} \times 2 = .44 \text{ hhd.}$ ;  
 $.44 \text{ hhd.} \times 63 = 27.72 \text{ gal.}$ ;  $.72 \text{ gal.} \times 4 = 2.88 \text{ qt.}$ ;  
 $.88 \text{ qt.} \times 2 = 1.76 \text{ pt.}$ ;  $.76 \text{ pt.} \times 4 = 3.04 \text{ gi.}$ ;  
*Ans.* 1 P. 27 gal. 2 qt. 1 pt. 3.04 gi.

## REDUCTION ASCENDING.

(371, page 200.)

- Ex. 1.  $1913551 \text{ dr.} \div 16 = 119596 \text{ oz.}$  15 dr.;  $119596 \text{ oz.} \div 16 = 7474 \text{ lb.}$  12 oz.;  $7474 \text{ lb.} \div 2000 = 3 \text{ T.}$  1474 lb.;  
*Ans.* 3 T. 14 cwt. 74 lb. 12 oz. 15 dr.  
 (198—200)

Ex. 2.  $97920 \text{ gr.} \div 20 = 4896 \text{ sc.}$ ;  $4896 \text{ sc.} \div 3 = 1632 \text{ dr.}$ ;  
 $1632 \text{ dr.} \div 8 = 204 \text{ oz.}$ ;  $204 \text{ oz.} \div 12 = 17 \text{ lb.}$ , *Ans.*

Ex. 3.  $1000000 \text{ in.} \div 12 = 83333 \text{ ft.}$  4 in.;  
 $83333 \text{ ft.} \div 3 = 27777 \text{ yd.}$  2 ft.;  
 $27777 \text{ yd.} \div 5\frac{1}{2} = 5050 \text{ rd.}$  2 yd.;  
 $5050 \text{ rd.} \div 40 = 126 \text{ fur.}$  10 rd.;  
 $126 \text{ fur.} \div 8 = 15 \text{ mi.}$  6 fur.;  
*Ans.* 15 mi. 6 fur. 10 rd. 2 yd. 2 ft. 4 in.

Ex. 4.  $120 \times 56 = 6720 \text{ sq. rd.}$ ;  
 $6720 \text{ sq. rd.} \div 160 = 42 \text{ A.}$ , *Ans.*

Ex. 5.  $60 \times 15 \times 10 = 9000 \text{ cu. ft.}$ ;  
 $9000 \text{ cu. ft.} \div 16 = 562 \text{ cd. ft.}$  8 cu. ft.;  
 $562 \text{ cd. ft.} \div 8 = 70 \text{ Cd.}$  2 cd. ft.;  
*Ans.* 70 Cd. 2 cd. ft. 8 cu. ft.

Ex. 6.  $28 \text{ ft.}$  6 in.  $= 342 \text{ in.}$ ;  $6 \text{ ft.} = 72 \text{ in.}$ ;  
 $342 \div 72 = 4\frac{3}{4} \text{ fath.}$ , *Ans.* Or,  
 $28 \text{ ft.}$  6 in.  $= 28\frac{1}{2} \text{ ft.}$ ;  $28\frac{1}{2} \div 6 = 4\frac{3}{4} \text{ fath.}$ , *Ans.*

Ex. 7.  $30876 \text{ gi.} \div 4 = 7719 \text{ pt.}$ ;  
 $7719 \text{ pt.} \div 2 = 3859 \text{ qt.}$  1 pt.;  
 $3859 \text{ qt.} \div 4 = 964 \text{ gal.}$  3 qt.;  
 $964 \text{ gal.} \div 63 = 15 \text{ hhd.}$  19 gal.;  
*Ans.* 15 hhd. 19 gal. 3 qt. 1 pt.

Ex. 8.  $27072 \text{ qt.} \div 8 = 3384 \text{ pk.}$ ;  $3384 \text{ pk.} \div 4 = 846 \text{ bu.}$ , *Ans.*

Ex. 9.  $254 \div 2 = 127 \text{ gi.}$ ;  $127 \text{ gi.} \div 4 = 31 \text{ pt.}$  3 gi.;  
 $31 \text{ pt.} \div 2 = 15 \text{ qt.}$  1 pt.;  $15 \text{ qt.} \div 4 = 3 \text{ gal.}$  3 qt.;  
*Ans.* 3 gal. 3 qt. 1 pt. 3 gi

Ex. 10.  $1234567 \text{ far.} \div 4 = 308641 \text{ d.}$  3 far.;  
 $308641 \text{ d.} \div 12 = 25720 \text{ s.}$  1 d.;  
 $25720 \text{ s.} \div 20 = \text{£}1286$ ; *Ans.*  $\text{£}1286$  1 d. 3 far.

Ex. 11. One half crown  $= 2 \text{ s.}$  6 d.  $= 30 \text{ d.}$ ;  
 $2468 \div 30 = 82\frac{4}{5}$  half crowns, *Ans*



Ex. 12.  $\$88.350 \div \$1.86 = 475$  francs, *Ans.*

Ex. 13.  $622080 \text{ cu. in.} \div 1728 = 360 \text{ cu. ft.};$   
 $360 \text{ cu. ft.} \div 40 = 9 \text{ T.}, \text{ } \textit{Ans.}$

Ex. 14.  $84621 \text{ m} \div 60 = 1410 \text{ f } 3 \text{ } 21 \text{ m}; 1410 \text{ f } 3 \div 8 =$   
 $176 \text{ f } 3 \text{ } 2 \text{ f } 3; 176 \text{ f } 3 \div 16 = 11 \text{ O.}; 11 \text{ O.} \div 8 = 1$   
 Cong. 3 O.; *Ans.* 1 Cong. 3 O. 2 f 3 21 m.

Ex. 15.  $135000000 \div 1728 = 78125$  great-gross, *Ans.*

Ex. 16.  $1020300'' \div 60 = 17005'; 17005' \div 60 = 283^\circ 25';$   
 $283^\circ \div 30 = 9 \text{ S. } 13^\circ; \text{ } \textit{Ans. } 9 \text{ S. } 13^\circ 25'.$

Ex. 17.  $411405 \text{ sec.} \div 60 = 6856 \text{ min. } 45 \text{ sec.}; 6856 \text{ min.} \div$   
 $60 = 114 \text{ h. } 16 \text{ min.}; 114 \text{ h.} \div 24 = 4 \text{ da. } 18 \text{ h.};$   
*Ans.* 4 da. 18 h. 16 min. 45 sec.

Ex. 18.  $412' \div 60 = 6^\circ 52', \text{ } \textit{Ans.}$

Ex. 19.  $360^\circ \times 60 = 21600'; 21600' \times 20 = 432000 \text{ min. of}$   
 time;  $432000 \text{ min.} \div 60 = 7200 \text{ h.}; 7200 \text{ h.} \div 24$   
 $300 \text{ da.}, \text{ } \textit{Ans.}$

Ex. 20.  $120 \times 144 = 17280; 17280 \div 20 = 864, \text{ } \textit{Ans.}$

Ex. 21.  $180^\circ \times 69.16 = 12448.8 \text{ mi.}, \text{ } \textit{Ans.}$

Ex. 22.  $45 \text{ min.} + 25 \text{ min.} = 70 \text{ min. gained each day};$   
 $36 \text{ yr.} \times 365 + 9 \text{ da.} = 13149 \text{ da.};$   
 $13149 \text{ da.} \times 70 = 920430 \text{ min.};$   
 $920430 \text{ min.} \div 60 = 15340 \text{ h. } 30 \text{ min.};$   
 $15340 \text{ h.} \div 24 = 639 \text{ da. } 4 \text{ h.};$   
*Ans.* 639 da. 4 h. 30 min

Ex. 23.  $20 \times 4 = 80 \text{ qt. bought.};$   
 $20 \times 282 = 5640 \text{ cu. in.}; 5640 \div 57\frac{3}{4} = 97\frac{5}{7} \text{ qt. sold};$   
 $97\frac{5}{7} \text{ qt.} - 80 \text{ qt.} = 17\frac{5}{7} \text{ qt. gained, } \textit{Ans.}$

Ex. 24.  $1500 \text{ bu.} \times 35 = 52500 \text{ lb.};$   
 $52500 \text{ lb.} \div 28 = 1875 \text{ bu.}, \text{ } \textit{Ans.}$

Ex. 25.  $120 \text{ lea} \times 3 \times 1.15 = 414 \text{ mi.}, \text{ } \textit{Ans.}$

- Ex. 26. 1 bbl. 1 gal. 2 qt.=33 gal.;  
 33 gal. $\times$ 231=7623 cu. in.;  
 7623 cu. in. $\div$ 282=27 $\frac{3}{4}$  beer gal., *Ans.*
- Ex. 27. 150 bu. $\times$ 2150.4=322560 cu. in.;  
 322560 $\div$ 2218.2=145.415+ Imp. bushels, *Ans.*
- Ex. 28. 68 ft. 8 in.=68 $\frac{3}{4}$  ft.; 68 $\frac{3}{4}$  $\times$ 33=2266 sq. ft.;  
 2266 sq. ft. $\div$ 100=22 $\frac{3}{50}$  squares, *Ans.*
- Ex. 29. 4 ft.=48 in.; 3 ft.=36 in.; 1 ft. 6 in.=18 in.;  
 48 $\times$ 36 $\times$ 18=31104 cu. in., *Ans.*
- Ex. 30. 120 $\times$ 56=6720 P.; 6720 P. $\div$ 160=42 A., *Ans.*
- Ex. 31. 356 dr. $\times$ 3 $\times$ 20=21360 gr.;  
 21360 gr. $\div$ 24=890 pwt.; 890 pwt. $\div$ 20=44 oz. 10 pwt.;  
 44 oz. $\div$ 12=3 lb. 8 oz.;  
*Ans.* 3 lb. 8 oz. 10 pwt.
- Ex. 32. 175 T. $\times$ 2240=392000 lb.; 392000 $\div$ 2000=196 T.,  
 short ton weight; \$3.75 $\times$ 175=\$656.25, cost;  
 \$4.50 $\times$ 196=\$882, sold for;  
 \$882—\$656.25=\$225.75 gain, *Ans.*
- Ex. 33. 73750 $\div$ 1.25=59000 sq. ft.;  
 59000 sq. ft. $\div$ 272 $\frac{1}{4}$ =216 P. 194 sq. ft.; 216 P.  
 $\div$ 160=1 A. 56 P.; *Ans.* 1 A. 56 P. 194 sq. ft.
- Ex. 34. 2492 lb. $\div$ 56=44.5 bushels of corn;  
 2175 lb. $\div$ 60=36.25 bushels of wheat;  
 \$.60 $\times$ 44.5=\$26.70; \$1.20 $\times$ 36.25=\$43.50;  
 \$26.70+\$43.50=\$70.20, *Ans.*
- Ex. 39. 
$$\begin{array}{r} 72 \overline{) 75} \\ \underline{42} \\ 4 \overline{) 175} \\ \underline{\phantom{00}} \end{array}$$
  
 \$43.75, *Ans.*
- Ex. 40. 
$$\begin{array}{r} 90 \overline{) 56} \\ \underline{76} \\ 3 \overline{) 76} \\ \underline{\phantom{00}} \end{array}$$
  
*Ans.* \$25.33 $\frac{1}{3}$ .

$$\begin{array}{r|l} \text{Ex. 41.} & 2 \\ & 126 \\ 21 & 2 \\ \hline \end{array}$$

24 lb., *Ans.*

$$\text{Ex. 42. } \frac{54 \times 70}{72} = \$52.50, \text{ rated at in Vermont;}$$

$\$52.50 + \$7.50 = \$60$ , to be sold for in New Jersey;

$$\frac{60 \times 90}{54} = 100 \text{ d.} = 8 \text{ s. } 4 \text{ d. } \textit{Ans.}$$

(372, page 203.)

$$\text{Ex. 1. } \frac{2}{9} \text{ s.} \times \frac{1}{20} = \mathcal{L} \frac{1}{90}, \textit{ Ans.}$$

$$\text{Ex. 2. } \frac{5}{7} \text{ pwt.} \times \frac{1}{21} \times \frac{1}{12} = \frac{1}{336} \text{ lb., } \textit{Ans.}$$

$$\text{Ex. 3. } \frac{4}{5} \text{ lb.} \times \frac{1}{2000} = \frac{1}{500} \text{ T., } \textit{Ans.}$$

$$\text{Ex. 4. } \frac{4}{9} \times \frac{20}{1} \text{ sec.} \times \frac{1}{60} \times \frac{1}{60} = \frac{1}{405} \text{ h., } \textit{Ans.}$$

$$\begin{aligned} \text{Ex. 5. } & \frac{3}{5} \text{ pt.} \times \frac{1}{2} \times \frac{1}{4} \times \frac{1}{63} = \frac{1}{840} \text{ hhd;} \\ & \frac{1}{630} \text{ hhd.} - \frac{1}{840} \text{ hhd.} = \frac{1}{560} \text{ hhd., } \textit{Ans.} \end{aligned}$$

$$\text{Ex. 6. } \frac{234}{1} \times \frac{1}{3} \times \frac{2}{7} \text{ pt.} \times \frac{1}{2} \times \frac{1}{8} = \frac{4}{9} \text{ pk.} = \frac{2}{9} \text{ of 2 pk., } \textit{Ans.}$$

$$\text{Ex. 7. } \frac{2}{3} \times \frac{4}{7} \times \frac{9}{14} \text{ cd. ft.} \times \frac{1}{8} = \frac{3}{98} \text{ Cd., } \textit{Ans.}$$

$$\text{Ex. 8. } \frac{3}{19} \times \frac{4}{17} \times \frac{19}{2} \text{ P.} \times \frac{1}{160} = \frac{3}{160} \text{ A., } \textit{Ans.}$$

$$\begin{aligned} \text{Ex. 9. } & \frac{3}{4} \times \frac{1}{2} \text{ fur.} \times \frac{1}{8} = \frac{33}{64} \text{ mi.; and } \frac{33}{64} \text{ mi. is } \frac{1}{2} \text{ of } \frac{1}{12} \text{ of} \\ & \frac{33}{64} \times \frac{2}{1} \times \frac{12}{1} \text{ mi.} = 12\frac{3}{8} \text{ mi., } \textit{Ans. Or,} \\ & \frac{3}{4} \times \frac{1}{2} \times \frac{1}{8} \times \frac{2}{1} \times \frac{12}{1} \text{ mi.} = 12\frac{3}{8} \text{ mi., } \textit{Ans.} \end{aligned}$$

$$\text{Ex. 10. } \frac{3}{4} \times \frac{6}{7} \times \frac{121}{6} \text{ cu. ft.} \times \frac{4}{99} = \frac{11}{21} \text{ Pch., } \textit{Ans.}$$

$$\text{Ex. 11. } \frac{15}{2} \times \frac{2}{1} \times \frac{13}{4} \text{ cu. ft.} \times \frac{1}{128} = \frac{195}{512} \text{ Cd., } \textit{Ans.}$$

$$\text{Ex. 12. } \frac{5}{7} \text{ in.} \times \frac{1}{45} = \frac{1}{63} \text{ E. E., } \textit{Ans.}$$

(373, page 205.)

$$\text{Ex. 1. } 2 \text{ R. } 20 \text{ P.} = 100 \text{ P.; } 1 \text{ A.} = 160 \text{ P.};$$

$$\frac{100}{160} \text{ A.} = \frac{5}{8} \text{ A., } \textit{Ans.}$$

$$\begin{aligned} \text{Ex. 2. } & 6 \text{ fur. } 26 \text{ rd. } 3 \text{ yd. } 2 \text{ ft.} = 4400 \text{ ft.; } 1 \text{ mi.} = 5280 \text{ ft.;} \\ & \frac{4400}{5280} \text{ mi.} = \frac{5}{6} \text{ mi., } \textit{Ans.} \end{aligned}$$

$$\begin{aligned} \text{Ex. 3 } & 18 \text{ s. } 5 \text{ d. } 2\frac{2}{13} \text{ far.} = 11\frac{520}{13} \text{ far; } \mathcal{L}1 = 960 \text{ d.;} \\ & \mathcal{L}11\frac{520}{13} \times \frac{1}{960} = \mathcal{L}1\frac{12}{13}, \textit{ Ans.} \end{aligned}$$

(203-205)

Ex. 4.  $7\frac{3}{4} 7\frac{3}{4} 2\frac{1}{2} 14 \text{ gr.} = 3834 \text{ gr.}; 21 \text{ lb.} = 120960 \text{ gr.};$   
 $\frac{3834}{120960} = \frac{71}{2240}, \text{ Ans.}$

Ex. 5.  $4 \text{ da. } 16 \text{ h. } 30 \text{ min.} = 6750 \text{ min.}; 3 \text{ wk.} = 30240 \text{ min.};$   
 $\frac{6750}{30240} = \frac{25}{112}, \text{ Ans.}$

Ex. 6.  $\frac{1\frac{3}{4}}{4} \text{ bu.} = \frac{7}{16} \text{ bu.}, \text{ Ans.}$

Ex. 7.  $28 \text{ gal. } 2 \text{ qt.} = 114 \text{ qt.}; 1 \text{ hhd.} = 252 \text{ qt.};$   
 $252 \text{ qt.} - 114 \text{ qt.} = 138 \text{ qt.}; \frac{138}{252} = \frac{23}{42}, \text{ Ans.}$

Ex. 8.  $4 \text{ bundles } 6 \text{ quires } 16 \text{ sheets} = 4000 \text{ sheets};$   
 $1 \text{ bale} = 4800 \text{ sheets}; \frac{4000}{4800} \text{ bales} = \frac{5}{6} \text{ of a bale}, \text{ Ans.}$

Ex. 9.  $\frac{4800}{54 \times 128} = \frac{25}{36}, \text{ Ans.}$

Ex. 10.  $\frac{\$7\frac{4}{11}}{11\frac{3}{7}} = \$\frac{81}{11} \times \frac{77}{90} = \$6\frac{3}{10} = \$6.30, \text{ Ans.}$

Ex. 11.  $3 \text{ O. } 3 \text{ f } \frac{3}{4} 1 \text{ f } \frac{3}{4} 36 \text{ m} = 24576 \text{ m};$   
 $1 \text{ Cong.} = 61440 \text{ m}; \frac{24576}{61440} \text{ Cong.} = \frac{2}{5} \text{ Cong.}, \text{ Ans.}$

Ex. 12.  $36 \text{ cu. ft. } 864 \text{ cu. in.} = 63072 \text{ cu. in.};$   
 $1 \text{ T.} = 50 \text{ cu. ft.} = 86400 \text{ cu. in.};$   
 $\frac{63072}{86400} = \frac{73}{100} \text{ T.}, \text{ Ans.}$

(374, page 206.)

Ex 1.	60	48.0 sec.	Ex. 2.	60	46.44"
	60	46.80 min.		60	27.774'
	24	9.78 h.		30	3.4629°
	7	5.4075 da.	Ans.		.11543 S.
Ans.		.7725 wk.			

(205, 206)

		Ex. 4.		24	19.2 gr.
				20	16.8 pwt
				4	2.84 oz.
Ex. 3.	40	11.52 P.			
	4	1.288 R.			
Ans.	.322 A.				
				Ans.	.71
Ex. 5.	12	11.04 in.	Ex. 6.	3.25 $\frac{3}{4} \div 12 = .2708\bar{3}$ lb.	
	3	1.92 ft.	Ex. 7.	16	12.00 P.
	5.5	2.64 yd.		10	4.75 sq. ch.
	40	28.48 rd.		23040	126.475 A.
Ans.	.712 fur.				
				Ans.	.0054893 + T <sub>F</sub> .
Ex. 8. 3.75 ft. $\div 6 = .625$ fath., Ans.					
Ex. 9. .45 pk. $\div 4 = .1125$ bu.; .1125 $\div 1.25 = .09$ , Ans.					
Ex. 10. 3 A. 2 R. = 560 P.; 1 R. 11.52 P. = 51.52 P.; 51.52 $\div 560 = .092$ , Ans.					
Ex. 11. $\frac{2}{7} \times \frac{1}{2} \times \frac{91}{4} \times \frac{1}{2000} = .001625$ , Ans.					
Ex. 12.	60	36.00 m	Ex. 13.	2	1.0 pt.
	8	5.6 f 3		4	3.5 qt.
Ans	.7 f 3				
				252	50.875 gal.
				Ans.	.20188 + T

## ADDITION.

(377, page 208.)

Ex. 3. Ans. 3 mi. 2 fur. 27 rd. 16 ft.

Ex. 4. Ans. 1017 A. 2 R. 36 P. 15 sq. yd. 5 sq. ft. 72 sq. in.

Ex. 7. Ans. 15 Cd. 4 cd. ft. 4 cu. ft.

(206—208)



Ex. 8.  $1\frac{2}{3}$  hhd. = 1 hhd. 42 gal.  
 42 gal. 3 qt.  $1\frac{1}{4}$  pt. = 42 " 3 qt. 1 pt. 1 gi.  
 $\frac{7}{8}$  gal. = 3 " 1 "  
 2 qt.  $\frac{3}{4}$  pt. = 2 " 0 " 3 "  
 1.75 pt. = 1 " 3 "

---

*Ans.* 2 hhd. 23 gal. 2 qt. 0 pt. 3 gi.

Ex. 9.  $145\frac{7}{8}$  A. = 145 A. 3 R. 20 P.  
 7 " 2 "  $29\frac{1}{2}$  "  
 1 " 3 "  $16\frac{1}{2}$  "  
 $\frac{5}{8}$  A. = 3 "  $13\frac{1}{3}$  "

---

156 A. 0 R.  $39\frac{1}{3}$  P., *Ans.*

Ex. 10. 31 bu. 2 pk.  
 $10\frac{7}{8}$  bu. = 10 " 3 " 4 qt.  
 5 bu.  $6\frac{1}{2}$  qt. = 5 " 0 " 6 " 1 pt.  
 14 bu. 2.75 pk. = 14 " 2 " 6 "  
 $\frac{2}{3}$  pk. = 5 "  $\frac{2}{3}$  "

---

62 bu. 1 pk. 5 qt.  $1\frac{2}{3}$  pt., *Ans.*

Ex. 11. 42 yr.  $7\frac{1}{2}$  mo. = 42 yr. 7 mo. 15 da.  
 10 yr. 3 wk. 5 da. = 10 " 0 " 26 "  
 $9\frac{3}{4}$  mo. = 9 " 22 " 12 h.  
 1 wk. 16 h. 40 min. = 7 " 16 " 40 min.  
 $\frac{5}{8}$  mo. = 25 "  
 $3\frac{4}{5}$  da. = 3 " 19 " 12 min.

---

*Ans.* 53 yr. 7 mo. 9 da. 23 h. 52 min.

Ex. 13.  $1\frac{1}{2}$  gross  $7\frac{1}{3}$  doz. = 304  
 3 "  $1\frac{3}{4}$  " = 453  
 $\frac{3}{4}$  great-gross = 1296  
 $6\frac{1}{4}$  doz. = 75  
 4 doz. 7 units = 55

---

2183, *Ans.*  
 (208, 209)

Ex. 15.  $3\frac{1}{3}$  Pch. 18 cu. ft. = 4 Pch. 1 cu. ft. 864 cu. in.  
 84.6 cu. ft. = 3 " 10 " 604.8 "  
 $\frac{5}{8}$  Pch. = 20 " 1080 "  
 $\frac{29}{27}$  cu. ft. = 1280 "

---

*Ans.* 8 Pch. 9 cu. ft. 804.8 cu in

Ex. 16. \$ 3.75  
 25.50  
 12.875  
 2.40  
 2.5475

---

\$47.0725, *Ans.*

Ex. 18. 42.4 bu.  
 2866 lb. = 49.414— "  
 $36\frac{3}{4}$  bu. = 36.75 "  
 39 bu. 29 lb. = 39.5 "

---

$\$.60 \times 168.063 = \$100.84—$ , *Ans.*

Ex. 19. 1.125 T.  
 $1\frac{2}{5}$  T. = 1.4 "  
 2500 lbs. = 1.25 "  
 $\$8 \times 3.775 = \$30.20$ , *Ans.*

Ex. 20.  $140\frac{1}{5}$  cu. yd. = 140.8 cu. yd.  
 24.875 "

46 cu. yd.  $20\frac{1}{4}$  cu. ft. = 46.75 "

---

212.425 cu. yd. removed,

$\$.18 \times 212.425 = \$38.24—$ , cost.

## SUBTRACTION.

(379, page 211.)

Ex. 3. *Ans.* 2 hhd. 54 gal.  $1\frac{3}{8}$  qt.

Ex. 4.

45 yr. 1 mo. 3 wk. 0 da.  $17\frac{1}{2}$  h.=45 yr. 1 mo. 21 da. 17.5 h.

10 " 9 " 1 " 22 " 6.8 " = 10 " 9 " 29 " 6.8 h.

---

*Ans.* 34 yr. 3 mo. 22 da. 10.7 h.Ex. 6. *Ans.* 12 cwt. 85 lb. 6 oz.Ex. 7. 2 wk.  $3\frac{5}{8}$  da.=2 wk. 3 da. 20 h..659 wk. = 4 " 14 " 42 min.  $43\frac{1}{5}$  sec.

---

*Ans.* 1 wk. 6 da. 5 h. 17 min.  $16\frac{4}{5}$  sec.Ex. 8.  $\frac{117}{224}$  hhd.=32.90625 gal.

.90625 "

---

32 gal., *Ans.*Ex. 9.  $\frac{3}{8}$  of  $3\frac{2}{3}$  A.=1 A. 1 R. 20 P.

3 " 12.56 "

---

2 R. 7.44 P., *Ans.*

Ex. 10. 10 lb. 8 oz. 8 pwt.

 $\frac{3}{40}$  lb.= 18 "

---

10 lb. 7 oz. 10 pwt., *Ans.*

Ex. 11. 36 Cd. 4 cd. ft.

10 " 6 " 12 cu. ft.

---

25 Cd. 5 cd. ft. 4 cu. ft., *Ans.*Ex. 12.  $5\frac{1}{2}$  bbl.=5 bbl. 15 gal. 3 qt. $\frac{4}{7}$  hhd.=1 " 4 " 2 "

---

4 bbl. 11 gal. 1 qt., *Ans.*

(211)

Ex. 13.  $\frac{2}{3}$  wk.=4 da. 16 h.

$\frac{607}{960}$  da.= 15 " 10 min. 30 sec.

---

4 da. 0 h. 49 min. 30 sec., *Ans.*

Ex. 14.  $\frac{5}{8}$  gross= $7\frac{1}{2}$  doz.;

$7\frac{1}{2}$  doz.— $\frac{2}{3}$  doz.= $6\frac{5}{6}$  doz., *Ans.*

Ex. 15.  $\frac{7}{9}$  mi.=6 fur. 8 rd. 4 yd. 2 ft. 8 in.

$\frac{21}{22}$  rd.= 5 " 0 " 9 "

---

6 fur. 7 rd.  $4\frac{1}{2}$  yd. 1 ft. 11 in.;

Or, 6 fur. 7 rd. 5 yd. 0 ft. 5 in., *Ans.*

Ex. 17.  $\frac{3}{4}$  pk.=6 qt.; .0625 bu.=2 qt.;

6 qt.—2 qt.=4 qt., *Ans.*

Ex. 18.  $\frac{5}{9}$  of  $365\frac{1}{4}$  da.=28 wk. 6 da. 22 h.

$\frac{3}{4}$  of  $5\frac{5}{9}$  wk.= 4 " 1 " 4 "

---

33 wk. 1 da. 2 h.— $49\frac{1}{7}$  min.=

33 wk. 1 da. 1 h.  $10\frac{6}{7}$  min., *Ans.*

Ex. 19.  $\frac{2}{7}$  of  $3\frac{3}{4}$  mi.+ $17\frac{1}{7}$  rd.=1 mi. 1 fur.;

1 mi. 1 fur.— $5\frac{1}{3}$  fur.= $3\frac{2}{3}$  fur., *Ans.*

Ex. 20. 15 bbl. 3.25 gal.=15 bbl. 3 gal. 1 qt.

14 " 24 " 3.54 "

---

$9\frac{1}{2}$  gal. 1.46 qt.;

Or, 9 gal. 3.46 qt., *Ans.*

Ex. 21. 1457 lb.+1578 lb.+1420 lb.=4455 lb.

=92 bu. 39 lb.; 200 bu.—92 bu. 39 lb.

=107 bu. 9 lb., *Ans.*

Ex. 22. 50 A. 136.4 P.

48 " 123.3 "

---

200 A.—99 A. 99.7 P.=100 A. 60.3 P.

=100.376875 A.;  $\$35 \times 100.376875$

= $\$3513.19+$ , *Ans.*

$$\begin{array}{r} \text{Ex. 23. } 58 \times 37 \times 6 = 12876 \text{ cu. ft.} = 476 \text{ cu. yd. } 24 \text{ cu. ft.;} \\ 476 \text{ cu. yd. } 24 \text{ cu. ft.} \\ 471 \text{ " } 16 \text{ " } 972 \text{ cu. in.} \end{array}$$

*Ans.* 5 cu. yd. 7 cu. ft. 756 cu. in.

$$\begin{array}{r} \text{Ex. 24. } \frac{4}{5} \text{ lb.} = 9 \text{ oz. } 12 \text{ pwt.} \quad \frac{3}{8} \text{ oz.} = 12 \text{ pwt.} \\ 4\frac{5}{8} \text{ oz.} = 4 \text{ " } 16 \text{ " } 16 \text{ gr.} \quad \frac{7}{8} \text{ pwt.} = 0 \text{ " } 21 \text{ gr.} \\ 31\frac{1}{3} \text{ pwt.} = 1 \text{ " } 11 \text{ " } 8 \text{ gr.} \\ \hline 1 \text{ lb. } 4 \text{ oz. } 0 \text{ pwt. } 0 \text{ gr.} \\ 11 \text{ " } 3 \text{ "} \end{array}$$

11 pwt. 3 gr.

1 lb. 3 oz. 8 pwt. 21 gr., *Ans.*

$$\text{Ex. 25. } 5\frac{7}{12} \text{ A.} = 5 \text{ A. } 2 \text{ R. } 13 \text{ P. } 10\frac{1}{12} \text{ sq. yd.}$$

$$\frac{2}{3} \text{ of } 6\frac{1}{4} \text{ A.} = 4 \text{ " } 0 \text{ " } 26 \text{ " } 20\frac{1}{6} \text{ "}$$

$$\frac{9\frac{1}{2}}{\text{---}} \text{ R.} = 30 \text{ "}$$

$$12\frac{2}{3}$$

$$\frac{3}{11} \text{ of } 2\frac{2}{11} \text{ P.} = 18 \text{ "}$$

$$9 \text{ A. } 3 \text{ R. } 30 \text{ P. } 18 \text{ sq. yd.}$$

$$4 \text{ " } 0 \text{ " } 25 \text{ " } 12 \text{ "}$$

$$5 \text{ A. } 3 \text{ R. } 5 \text{ P. } 6 \text{ sq. yd., } \textit{Ans.}$$

(380, page 213.)

$$\text{Ex. 1. } 1783 \text{ yr. } 1 \text{ mo. } 20 \text{ da.} \quad \text{Ex. 2. } 1732 \text{ yr. } 2 \text{ mo. } 22 \text{ da.}$$

$$1775 \text{ " } 4 \text{ " } 19 \text{ "}$$

$$1620 \text{ " } 12 \text{ " } 22 \text{ "}$$

$$\textit{Ans. } 7 \text{ yr. } 9 \text{ mo. } 1 \text{ da.}$$

$$111 \text{ yr. } 2 \text{ mo., } \textit{Ans.}$$

$$\text{Ex. 3. } 1860 \text{ yr. } 7 \text{ mo. } 4 \text{ da.} \quad \text{Ex. 4. } 1861 \text{ yr. } 6 \text{ mo. } 3 \text{ da.}$$

$$1607 \text{ " } 5 \text{ " } 23 \text{ "}$$

$$1859 \text{ " } 1 \text{ " } 30 \text{ "}$$

$$\textit{Ans. } 253 \text{ yr. } 1 \text{ mo. } 11 \text{ da.}$$

$$\textit{Ans. } 2 \text{ yr. } 4 \text{ mo. } 3 \text{ da.}$$

(212, 213)



Ex. 6 From July 4, 1855, to July 4, 1860, is 366 da.  
 $+365 \text{ da.} + 365 \text{ da.} + 365 \text{ da.} + 366 \text{ da.} = 1827 \text{ da.}$ ;  
 From July 4, 1860, to Dec. 12, 1860, is 27 da.  
 $+31 \text{ da.} + 30 \text{ da.} + 31 \text{ da.} + 30 \text{ da.} + 12 \text{ da.} = 161$   
 da.; from 16 minutes past 10 o'clock A. M., to 22  
 minutes before 8 o'clock P. M., is 9 h. 22 min.;  
 hence  $1827 \text{ da.} + 161 \text{ da.} + 9 \text{ h. 22 min.}$   
 $= 1988 \text{ da. 9 h. 22 min., Ans.}$

Ex. 7. 1862 yr. 1 mo. 1 da. 4 h. 55 min. 24 sec.  
 1860 " 4 " 21 " 12 " 40 " 25 "

---

1 yr. 8 mo. 9 da. 16 h. 14 min. 59 sec.

As the full year is a common year, and the full months  
 commence with May, the  $1 \text{ yr. 8 mo. 9 da.} = 365 \text{ da.} + 31 \text{ da.}$   
 $+ 30 \text{ da.} + 31 \text{ da.} + 31 \text{ da.} + 30 \text{ da.} + 31 \text{ da.} + 30 \text{ da.} + 31 \text{ da.}$   
 $+ 9 \text{ da.} = 619 \text{ da.}$ ; hence,  $619 \text{ da. 16 h. 14 min. 59 sec., Ans.}$

Ex. 8.  $27 - 4 = 23$ ;  $242 \text{ da.} + 23 \text{ da.} = 265 \text{ da., Ans.}$

---

### MULTIPLICATION.

(382, page 215.)

Ex. 3. *Ans.* 44 A. 3 R. 2 P. 9 sq. yd. 6 sq. ft.

Ex. 4. *Ans.* 131 Cd. 5 cd. ft. 12 cu. ft.

bu. pk. qt. pt.  
 Ex. 5. 34 3 6 1  
                     2

---

69 3 5

7

---

489 1 3, *Ans.*

lb. oz. pwt.  
 Ex. 6. 4 10 18.7  
                     9

---

44 2 8.3

3

---

132 7 4.9, *Ans*

(214, 215)

	lb.	3	3	9	gr.		gal.	qt.	pt.	gi.
Ex. 7.	9	3	2	13		Ex. 8.	5	2	1	3.25
				7						12

5	6	3	0	11
				5

68	2	1	3
			8

27	7	7	2	15,	Ans.	549	3		, Ans.
----	---	---	---	-----	------	-----	---	--	--------

	A.	R.	P.	sq. yd.
Ex. 9.	78	3	15	15
				15 $\frac{2}{3}$

1182	2	32	13 $\frac{1}{4}$	product by 15
52	2	10	10	" " $\frac{2}{3}$

1235	1	2	23 $\frac{1}{4}$ ,	Ans.
------	---	---	--------------------	------

	cu. yd.	cu. ft.	cu. in.
Ex. 10.	9	10	1424
			8

75	5	1024	product by 8;
		9	

676	23	576	product by 8×9=72
9	10	1424	" " 1

Ans. 686	7	272	" " 73
----------	---	-----	--------

Ex. 11.	27 lb.	2 oz.	17 pwt.	12 gr.,	product by 10
	163	" 5	" 5	" 0	" " 10×6=60

Subtract	2	" 8	" 13	" 18	" " 1
----------	---	-----	------	------	-------

Ans.	160 lb.	8 oz.	11 pwt.	6 gr.,	" " 60—1=59
------	---------	-------	---------	--------	-------------

Ex. 12.	22 yd.	0 ft.	11.5 in.,	product by 5
	111	" 1	" 9.5	" " 5×5=25

Ans.	557	" 2	" 11.5	" " 5×5×5=125
------	-----	-----	--------	---------------

Ex. 13. 1 qt. 2 gi. =  $1\frac{1}{4}$  qt.;

$$1\frac{1}{4} \text{ qt.} \times 144 = 180 \text{ qt.} = 45 \text{ gal., Ans.}$$

Ex. 14. 5 Cong. 5 O. 15 f 3 2 f 3 30 m, prod. by 6

$$\text{Ans. } 22 \text{ " } 7 \text{ " } 13 \text{ " } 2 \text{ " } , \text{ " " } 6 \times 4 = 24$$

Ex. 15. 14 hhd. 46 gal. 1 qt. 0 pt. 2.4 gi., prod. by 4

$$58 \text{ " } 59 \text{ " } 1 \text{ " } 0 \text{ " } 1.6 \text{ " } , \text{ " " } 4 \times 4 = 16$$

$$3 \text{ " } 43 \text{ " } 0 \text{ " } 0 \text{ " } 2.6 \text{ " } , \text{ " " } 1$$

---


$$\text{Ans. } 62 \text{ hhd. } 39 \text{ gal. } 1 \text{ qt. } 1 \text{ pt. } .2 \text{ gi., " " } 16 \times 1 = 17$$

Ex. 16. 9 T. 13 cwt. 1 qr. 10.5 lb. = 9.6671875 T.;

$$9.6671875 \text{ T.} \times 1.7 = 16.43421875 \text{ T.}$$

$$= 16 \text{ T. } 8 \text{ cwt. } 2 \text{ qr. } 20.65 \text{ lb., Ans.}$$

Ex. 17. 2 hhd. 23 gal. 2 qt. 1 pt. = 2.375 hhd.;

$$2.375 \text{ hhd.} \times 4.8 = 11.4 \text{ hhd.}$$

$$= 11 \text{ hhd. } 25 \text{ gal. } 1 \text{ pt. } 2.4 \text{ gi., Ans.}$$

Ex. 18. 9 oz. 13 pwt. 8 gr.  $\times 12 = 9 \text{ lb. } 8 \text{ oz.} = 9\frac{2}{3} \text{ lb., whole}$

$$\text{weight; } \$212.38 \times 9\frac{2}{3} = \$2053.00\frac{2}{3}, \text{ Ans.}$$

Ex. 19. 27 gal. 3 qt. 1 pt. = 27.875 gal.;

$$27.875 \text{ gal.} \times 5 = 139.375 \text{ gal.};$$

$$\$1.375 \times 139.375 = \$191.64+, \text{ Ans.}$$

Ex. 20. 37 bu. 3 pk. 5 qt. = 37.90625 bu.;

$$37.90625 \text{ bu.} \times 5 = 189.53+ \text{ bu.};$$

$$$.65 \times 189.53 = \$123.20-, \text{ Ans.}$$

## DIVISION.

(383, page 218.)

Ex. 6. Ans. 21 bu. 1 pk. 5 qt. 1 p.

yd. ft. in.

Ex. 7. 3) 336 4 3 $\frac{1}{3}$

$$\begin{array}{r} 7 \overline{) 112 \ 1 \ 5\frac{1}{9}} \\ 16 \ 0 \ 2\frac{4}{9}, \text{ Ans.} \end{array}$$

Ex. 9. *Ans.* 10 cu. yd. 3 cu. ft. 428.15 cu. in.

$$\begin{array}{r} \text{mi. fur. rd. yd.} \\ \text{Ex. 10. } 9 \overline{) 1986 \ 3 \ 20 \ 1} \\ 12 \overline{) 220 \ 5 \ 28 \ 5} \\ 18 \ 3 \ 5 \ 4\frac{1}{12}, \text{ Ans.} \end{array}$$

$$\begin{array}{r} \text{sq. mi. A. R. P.} \\ \text{Ex. 11. } \begin{array}{r} 12 \ 0 \ 1 \ 30 \\ 2 \\ 45 \overline{) 24 \ 0 \ 3 \ 20} \\ 341 \ 1 \ 16\frac{4}{9}, \text{ Ans.} \end{array} \end{array}$$

Ex. 12. *Ans.* 1 da.  $12\frac{2}{40}$  h.

$$\begin{array}{r} \text{cu. yd. cu. ft. cu. in.} \\ \text{Ex. 13. } 33\frac{1}{3} = 100\frac{2}{3}; \quad \begin{array}{r} 3794 \ 20 \ 709\frac{1}{3} \\ 3 \\ 100 \overline{) 11384 \ 7 \ 400} \\ 113 \ 22 \ 1300, \text{ Ans.} \end{array} \end{array}$$

$$\begin{array}{r} \text{lb. } \overline{3 \ 3 \ 9} \text{ gr.} \\ \text{Ex. 14. } 13\frac{3}{4} = 5\frac{5}{4}; \quad \begin{array}{r} 121 \ 3 \ 2 \ 1 \ 4 \\ 4 \\ 11 \overline{) 485 \ 1 \ 1 \ 1 \ 16} \\ 5 \overline{) 44 \ 1 \ 1 \ 1 \ 16} \\ 8 \ 9 \ 6 \ 2 \ 3\frac{1}{5}, \text{ Ans.} \end{array} \end{array}$$

(218)

Ex. 15.  $28^{\circ} 51' 27.765'' = 28.8577125^{\circ}$ ;  
 $28.8577125^{\circ} \div 2.754 = 10.478472^{\circ}$ ;  
 $10.478472^{\circ} = 10^{\circ} 28' 42\frac{1}{2}''$ , *Ans.*

	yd.	ft.	in.
Ex 16.	202	1	$6\frac{3}{4}$
			5
<hr/>			
3)	1012	1	$9\frac{3}{4}$
<hr/>			
	337	1	$7\frac{1}{4}$ , <i>Ans.</i>

	da.	h.	min.
Ex. 17.	10)	1950	15 $15\frac{5}{9}$
	<hr/>		
	10)	195	1 $31\frac{5}{9}$
	<hr/>		
<i>Ans.</i>	19	12	$9\frac{7}{5}$

Ex. 18.  $4 \text{ sq. mi.} \div 124 = 82 \text{ A. 2 R. } 12\frac{2}{3}\frac{8}{1} \text{ P., } \textit{Ans.}$

Ex. 19.  $48\frac{1}{2} \times 24 \times 6\frac{1}{2} = 7566 \text{ cu. ft.} = 280 \text{ cu. yd. 6 cu. ft.}$ ;  
 $48)280 \text{ cu. yd. 6 cu. ft.}$

$5 \text{ cu. yd. 22 cu. ft. 1080 cu. in., } \textit{Ans.}$

Ex. 20.  $2 \text{ bu. 3 pk. 6 qt.} = 94 \text{ qt.}$ ;  $356 \text{ bu. 3 pk. 5 qt.}$   
 $= 11421 \text{ qt.}$ ;  $11421 \div 94 = 121\frac{1}{2}$ , *Ans.*

## LONGITUDE AND TIME.

(385, page 219.)

Ex. 1. 9 h.

8 " 7 min. 4 sec.

Ex. 2. 1 h. 11 min. 56 sec.

15

---

52 min. 56 sec.

15

Take  $17^{\circ} 59'$

From  $89^{\circ} 2'$

---

13° 14' 0" diff. lon.

77° 1'

---

71° 3', *Ans.*

---

90° 15', *Ans.*

(218, 219)



- Ex. 3. 9 h. 13 min. 20 sec. A. M., time at the easterly place;  
 2 h. 30 min. A. M., " " westerly "  


---

 6 h. 43 min. 20 sec., difference of time;  
 6 h. 43 min. 20 sec.  $\times 15 = 100^\circ 50'$ , diff. lon.;  
 $100^\circ 50' - 18^\circ 28' = 82^\circ 22'$  west, *Ans.*
- Ex. 4. 6 h. 8 min. 28 sec.  $\times 15 = 92^\circ 7'$ , *Ans.*
- Ex. 5. 1 h. 18 min. 16 sec.  $\times 15 = 19^\circ 34'$ ;  
 $94^\circ 44' - 19^\circ 34' = 75^\circ 10'$  west, *Ans.*
- Ex. 6. 2 h. 58 min.  $23\frac{1}{3}$  sec.  $\times 15 = 44^\circ 35' 50''$ , diff. in lon.;  
 $77^\circ 51' + 44^\circ 35' 50'' = 122^\circ 26' 50''$  west, *Ans.*
- Ex. 7. 2 h. 33 min.  $53\frac{14}{5}$  sec.  $\times 15 = 38^\circ 28' 29''$ , diff. in lon.;  
 $71^\circ 12' 15'' + 38^\circ 28' 29''$   
 $= 109^\circ 40' 44''$  west, *Ans.*
- Ex. 8. 5 h. 40 min. 20 sec.  $\times 15 = 85^\circ 5'$  west, *Ans.*
- Ex. 9. 12 h. — 5 h. 51 min.  $41\frac{3}{5}$  sec.  $= 6$  h. 8 min.  $18\frac{2}{5}$  sec.,  
 diff. time; 6 h. 8 min.  $18\frac{2}{5}$  sec.  $\times 15 = 92^\circ 4' 36''$ ,  
 diff. in lon.;  $92^\circ 4' 36'' - 18^\circ 3' 30''$   
 $= 74^\circ 1' 6''$  west, *Ans.*
- Ex. 10. 8 h. 53 min. 47 sec.  
 $3.56 \text{ sec.} \times 24 = 1 \text{ " } 25.44 \text{ "}$   


---

Take	8 h. 52 min. 21.56 sec.	}	true time at N. York;
From	10 " 4 " 36.80 "		

---

1 h. 12 min. 15.24 sec., diff. time;  
 1 h. 12 min. 15.24 sec.  $\times 15 = 18^\circ 3' 48.6''$ , *Ans.*

(386, page 221.)

- Ex. 1.  $84^\circ 24' - 77^\circ 1' = 7^\circ 23'$ , diff. in longitude;  
 $7^\circ 23' \div 15 = 29 \text{ min. } 32 \text{ sec.}$ , diff. in time, *Ans.*

(220, 221)

Ex. 2.  $113^{\circ} 14' - 2^{\circ} 20' = 110^{\circ} 54'$ , diff. in longitude;  
 $110^{\circ} 54' \div 15 = 7$  h. 23 min. 36 sec., *Ans.*

Ex. 3.  $78^{\circ} 55' + 20^{\circ} 30' = 99^{\circ} 25'$ , diff. in lon.;  
 $99^{\circ} 25' \div 15 = 6$  h. 37 min. 40 sec., *Ans.*

Ex. 4.  $74^{\circ} 1' - 63^{\circ} 36' = 10^{\circ} 25'$ , diff. in lon.;  
 $10^{\circ} 25' \div 15 = 41$  min. 40 sec., diff. in time;  
 4 h. 30 min. P. M.—41 min. 40 sec.  
 $= 3$  h. 48 min. 20 sec. P. M., *Ans.*

Ex. 5.  $71^{\circ} 7' + 5' 2'' = 71^{\circ} 12' 2''$ , diff. in lon.;  
 $71^{\circ} 12' 2'' \div 15 = 4$  h. 44 min.  $48\frac{2}{15}$  sec., diff. in  
 time; 12 h. M.—4 h. 44 min.  $48\frac{2}{15}$  sec.  
 $= 7$  h. 15 min.  $11\frac{1}{3}$  sec. A. M., *Ans.*

Ex. 6.

$118^{\circ} + 120^{\circ} = 238^{\circ}$ , diff. in lon. reckoned west from Pekin;  
 $360^{\circ} - 238^{\circ} = 122^{\circ}$ , “ “ “ “ “ Sacramento;  
 $238^{\circ} \div 15 = 15$  h. 52 min., Sacramento earlier than Pekin; or  
 $122^{\circ} \div 15 = 8$  h. 8 min. “ later “ “

Ex. 7.  $35^{\circ} 32' + 76^{\circ} 37' = 112^{\circ} 9'$ , diff. in lon.;  
 $112^{\circ} 9' \div 15 = 7$  h. 28 min. 36 sec., diff. in time;  
 6 h. 40 min. A. M. + 7 h. 28 min. 36 sec.  
 $= 2$  h. 8 min. 36 sec. P. M., *Ans.*

Ex. 8. 6 h. P. M.—7 h. 28 min. 36 sec.  
 $= 10$  h. 31 min. 24 sec. A. M., *Ans.*

NOTE.—We always subtract the difference of time from the time at the easterly place to obtain the time at the westerly place, adding 12 h. to the minuend if necessary to make the subtraction possible; and we always add the difference of time to the westerly place to obtain the time at the easterly place, rejecting 12 h. when the amount exceeds this time. And whenever 12 h. are borrowed in subtracting, or rejected in adding, the time changes from A. M. to P. M., or from P. M. to A. M.

- Ex. 9.  $94^{\circ} 46' 34'' - 72^{\circ} 35' 45'' = 22^{\circ} 10' 49''$ , diff. in lon.;  
 $22^{\circ} 10' 49'' \div 15 = 1 \text{ h. } 28 \text{ min. } 43\frac{4}{15} \text{ sec.}$ , diff. in  
time; 6 h. 20 min. A. M.—1 h. 28 min.  $43\frac{4}{15} \text{ sec.}$   
 $= 4 \text{ h. } 51 \text{ min. } 16\frac{11}{15} \text{ sec.}$  A. M., *Ans.*
- Ex. 10.  $28^{\circ} 49' + 93^{\circ} 5' = 121^{\circ} 54'$ , diff. in lon.;  
 $121^{\circ} 54' \div 15 = 8 \text{ h. } 7 \text{ min. } 36 \text{ sec.}$ , diff. in time;  
3 h. P. M.+8 h. 7 min. 36 sec.  
 $= 11 \text{ h. } 7 \text{ min. } 36 \text{ sec.}$  P. M., *Ans.*
- Ex. 11. 12 h. M.—8 h. 7 min. 36 sec.  
 $= 3 \text{ h. } 52 \text{ min. } 24 \text{ sec.}$  P. M., *Ans.*
- Ex. 12.  $88^{\circ} 1' 29'' + 5' 2'' = 88^{\circ} 6' 31''$ , diff. in lon.;  
 $88^{\circ} 6' 31'' \div 15 = 5 \text{ h. } 52 \text{ min. } 26\frac{1}{15} \text{ sec.}$ , diff. in  
time; 12 h. M.+5 h. 52 min.  $26\frac{1}{15} \text{ sec.}$   
 $= 5 \text{ h. } 52 \text{ min. } 26\frac{1}{15} \text{ P. M.}$ , *Ans.*

PROMISCUOUS EXAMPLES IN COMPOUND NUMBERS.

(Page 222.)

- Ex. 1. *Ans.* 55799 gr.
- Ex. 2. 3 cwt. 12 lb.=.156 T.;  $\$15.50 \times .156 = \$2.418$ , *Ans.*
- Ex. 3. 27 yd. 2 qr.=110 qr.;  $110 \text{ qr.} \div 5 = 22 \text{ ells}$ , *Ans.*
- Ex. 4.  $\$18.945 \div \$4.84 = \text{£}3.914256$   
 $= \text{£}3 \text{ } 18 \text{ s. } 3 \text{ d. } 1.6 + \text{qr.}$ , *Ans.*
- Ex. 5. *Ans.* 130413645 sec.
- Ex. 6. 24 sheets  $\times 8 \times 2 = 384 \text{ pages}$ , *Ans.*
- Ex. 7. 1 s. 6 d.=18 d.;  $\text{£}5 \text{ } 6 \text{ s. } 6 \text{ d.} = 1278 \text{ d.}$ ;  
 $1278 \div 18 = 71 \text{ yd.}$ , *Ans.*
- Ex. 8. *Ans.* 37173 l.
- Ex. 9. *Ans.* 111111 sq. yd.
- Ex. 10. 3 gal. 1 qt. 1 pt.=27 pt.; 3 hhd.=1512 pt.;  
 $1512 \text{ pt.} \div 27 \text{ pt.} = 56$ , *Ans.*

Ex. 11.  $2\frac{1}{2}$  T.=5000 lb.;  $\$.095 \times 5000 = \$475$ , sold for;  
 $\$475 - \$375.75 = \$99.25$ , *Ans.*

Ex. 12. 3 lb. 9 oz.=900 pwt.; 1 oz. 5 pwt.=25 pwt.;  
 $900 \div 25 = 36 = 3$  doz., *Ans.*

Ex. 13. 4 gal. 3 qt.=152 gi.; 2 qt. 1 pt. 2 gi.=22 gi.;  
 $\frac{22}{152} = \frac{11}{76}$ , *Ans.*

Ex. 14.  $\frac{3}{7} \times \frac{4}{11}$  rd.  $\times \frac{1}{2} = \frac{6}{7}$  yd., *Ans.*

Ex. 15.  $26\frac{1}{2} \times 20 = 530$  sq. ft.= $58\frac{8}{9}$  sq. yd.= $58\frac{8}{9}$  yd., *Ans.*

Ex. 16. 15 T. 3 cwt. 3 qr. 24 lb. long ton weight=34044  
 lb.=17.022 T. short ton weight; hence  
 $\$140 \times 17.022 = \$2383.08$ , sold for;  
 $\$.06 \times 34044 = \$2042.64$ , cost;

$\$340.44$  gained, *Ans.*

Ex. 17.  $(40 \text{ ft.} + 36\frac{1}{2} \text{ ft.}) \times 2 = 153 \text{ ft.}$ , round the room;  
 $153 \times 22\frac{1}{4} = 3404\frac{1}{4}$  sq. ft. in the walls;  
 $36\frac{1}{2} \times 40 = 1460$  sq. ft. in the ceiling;  
 $3404\frac{1}{4} \text{ sq. ft.} + 1460 \text{ sq. ft.} - 1375 \text{ sq. ft.} = 3489\frac{1}{4} \text{ sq. ft.}$   
 to be paid for, at  $\frac{1}{9} = 2$  cents per sq. ft.;  
 hence  $3489\frac{1}{4} \times 2 = \$69.785$ , *Ans.*

Ex. 18. 78 lb. 9 oz.  $\times 23 = 18$  cwt. 6 lb. 15 oz., *Ans.*

Ex. 19.  $33^\circ 2' + 30^\circ 41' = 63^\circ 43'$ , *Ans.*

Ex. 20. 1 gross 4 doz.=16 doz.;  
 $16 \text{ doz.} \times 31 = 496 \text{ doz.}$ , *Ans.*

Ex. 21. 4 sq. rd. 120 sq. ft. 84 sq. in.  $\times 18$   
 $= 79 \text{ sq. rd. } 264\frac{1}{4} \text{ sq. ft. } 72 \text{ sq. in.};$   
 $160 \text{ sq. rd.} - 79 \text{ sq. rd. } 262\frac{1}{4} \text{ sq. ft. } 72 \text{ sq. in.}$   
 $= 80 \text{ sq. rd. } 7 \text{ sq. ft. } 72 \text{ sq. in.}$ , *Ans.*

Ex. 22.  $\$12.025 \div \$13 = .925$  T.=1850 lb., *Ans.*

Ex. 23. 1 pk. 4 qt.=.375 bu.;  $\$.72 \div .375 = \$1.92$ , *Ans.*

Ex. 24.  $36244 \text{ lb.} \div 60 = 604\frac{1}{5}$  bu., *Ans.*

$$\text{Ex. 25. } 32 \times 24 \times 6 = 4608 \text{ cu. ft.} = 170\frac{2}{3} \text{ cu. yd.};$$

$$\$ .20 \times 170\frac{2}{3} = \$34.13+, \text{ Ans.}$$

$$\text{Ex. 26. } (32 \text{ ft.} + 24 \text{ ft.}) \times 2 = 112 \text{ ft., mason's girt};$$

$$112 \times 6 \times 1\frac{1}{2} = 1008 \text{ cu. ft.} = 40\frac{8}{11} \text{ Pch.};$$

$$\$1.25 \times 40\frac{8}{11} = \$50.90\frac{10}{11}, \text{ Ans.}$$

$$\text{Ex. 27. } 1 \text{ mi.} = 5280 \text{ ft.}; 10 \text{ ft. } 4 \text{ in.} = 10\frac{1}{3} \text{ ft.};$$

$$\frac{248}{1} \times \frac{5280}{1} \times \frac{3}{31} = 126720 \text{ times, hind wheels};$$

$$\frac{248}{1} \times \frac{5280}{1} \times \frac{2}{31} = 84480 \text{ " forward "}$$


---


$$42240 \text{ times, Ans.}$$

$$\text{Ex. 28. } \$3.75 \times 15.22 = \$57.075$$

$$4.25 \times 7.36 = 31.28$$


---


$$\$88.355 \text{ cost};$$

$$\$ .045 \times 2258 = 101.61 \text{ sold for};$$


---


$$\$13.255, \text{ Ans.}$$

$$\text{Ex. 29. } \frac{5}{7} \text{ of } 3 \text{ T. } 10 \text{ cwt.} = 5000 \text{ lb.}$$

$$\frac{4}{13} \text{ of } 7 \text{ T. } 3 \text{ cwt. } 26 \text{ lb.} = 4408 \text{ lb.}$$


---


$$592 \text{ lb., Ans.}$$

$$\text{Ex. 30. } 16 \text{ lb. } 5 \text{ oz. } 10 \text{ pwt. } 13 \text{ gr. Troy} = 94813 \text{ gr.};$$

$$94813 \text{ gr.} \div 7000 = 13.5447 + \text{lb. Avoirdupois};$$

$$13.5447 + \text{lb.} = 13 \text{ lb. } 8 \text{ oz. } 11.4 + \text{dr., Ans.}$$

$$\text{Ex. 31. } 1 \text{ ft. } 7.8 \text{ in.} = 1.65 \text{ ft.} = .1 \text{ rd., Ans.}$$

$$\text{Ex. 32. } 9 \text{ in.} = \frac{3}{4} \text{ ft.}; 6 \text{ in.} = \frac{1}{2} \text{ ft.};$$

$$\frac{3}{1} \times \frac{4}{3} \times \frac{2}{1} = 8 \text{ ft., Ans.}$$

$$\text{Ex. 33. } 16 \text{ in.} = \frac{4}{3} \text{ ft.}; 7 \times \frac{3}{4} = 5\frac{1}{4} \text{ ft., Ans.}$$

$$\text{Ex. 34. } 17280 \text{ cu. in.} \div 268\frac{4}{5} = 64\frac{2}{7} \text{ gallons, dry measure,}$$

$$17280 \text{ cu. in.} \div 282 = 61\frac{13}{14} \text{ " beer "}$$

---


$$\text{Difference } 3\frac{3}{32}\frac{9}{9} \text{ gallons, Ans.}$$

$$(223, 224)$$



Ex. 35.  $\frac{60}{1} \times \frac{7}{4} \times \frac{13}{12}$  ft.  $\times \frac{1}{50} = 2.275$  tons, *Ans.*

Ex. 36.  $7\frac{1}{2}$  bu. = 3 pk.  $4\frac{4}{5}$  qt.;  $\frac{5}{8} \times \frac{56}{5} \times \frac{10}{3}$  qt. =  $1\frac{5}{9}$  qt.;  
 $8\frac{1}{3}$   
 3 pk.  $4\frac{4}{5}$  qt. +  $1\frac{5}{9}$  qt. = 3 pk.  $6\frac{16}{45}$  qt.;  
 5 bu.  $3\frac{31}{45}$  qt. — 3 pk.  $6\frac{16}{45}$  qt.  
 = 4 bu.  $5\frac{1}{3}$  qt. =  $16\frac{2}{3}$  pk., *Ans.*

	sq. mi.	A.	R.	P.	sq. yd.	mi.	A.	R.	P.	sq. yd.
Ex. 37.	5	250	3	0	0		456	3	14	25
					7					$3\frac{1}{4}$
8)37	475	1				2	90	2	4	$14\frac{1}{2}$
							114	0	33	$21\frac{3}{8}$
	4	459	1	25						
	2	204	2	38	$5\frac{5}{8}$	2	204	2	38	$5\frac{5}{8}$
	2	254	2	26	$24\frac{5}{8}$ , <i>Ans.</i>					

Ex. 38.  $14.2878 \times 5.6 = 80.01168$  lb.  
 = 80 lb. 2 pwt. 19.2768 gr., *Ans.*

Ex. 39.  $\frac{5}{8}$  of 24 = 15 carats fine, *Ans.*

Ex. 40.  $24 - 16 = 8$  carats =  $\frac{8}{24} = \frac{1}{3}$  alloy, *Ans.*

Ex. 41.  $384\frac{4}{5}$  A. = 384 A. 3 R. 8 P.

22 " 1 " 20 "

2)362 A. 1 R. 28 P. (See Prob. 33, p. 64.)

181 A. 0 R. 34 P., younger;  
 203 " 2 " 14 ", elder.

Ex. 42.  $4000$  bu.  $\times \frac{52}{58} = 3586\frac{6}{59}$  bu., *Ans.*

Ex. 43.  $110$  bu.  $\times 64 = 7040$  lb. clover seed exchanged;  
 $7040$  lb.  $\div 60 = 117\frac{1}{3}$  bu. clover seed, N. Y. measure;  
 $117\frac{1}{3} \times \frac{4}{1} \times \frac{3}{2} = 704$  bu. corn received, N. Y. measure;  
 $704 \times \frac{58}{1} \times \frac{1}{56} = 729\frac{1}{7}$  bu. corn, N. J. measure;

$$\$ \frac{2}{3} \times 729 \frac{1}{7} = \$486 \frac{2}{7}, \text{ corn brought in N. J. ;}$$

$$\$4 \times 110 = \$440, \text{ clover seed worth in N. J. ;}$$

$$\$ 46 \frac{2}{7}, \text{ the N. J. farmer gained ;}$$

$$110 \times \frac{4}{1} \times \frac{3}{2} = 660 \text{ bu. corn, he would have received}$$

had the standards of measure been the same ;

$$\text{hence } 729 \frac{1}{7} \text{ bu.} - 660 \text{ bu.} = 69 \frac{1}{7} \text{ bu. corn, gained by}$$

the N. J. farmer in the reckoning.

$$\text{Ex. 44. } 763.4 \times 763.4 = 582779.56 \text{ sq. ft.}$$

$$= 13 \text{ A. } 1 \text{ R. } 20 \text{ P. } 164.56 \text{ sq. ft., Ans.}$$

$$\text{Ex. 45. } 20 \frac{1}{2} \text{ ft.} \times 2 = 41 \text{ ft., width of both sides ;}$$

$$42 \times 41 = 1722 \text{ sq. ft.} = 17.22 \text{ squares ;}$$

$$\$4.62 \frac{1}{2} \times 17.22 = \$79.64 \frac{1}{4}, \text{ Ans.}$$

$$\text{Ex. 46. } 17 \text{ T. } 15 \text{ cwt. } 62 \frac{1}{2} \text{ lb.} = 17.78125 \text{ T. ;}$$

$$\$1333.593 \div 17.78125 = \$75, \text{ nearly, Ans.}$$

$$\begin{array}{r} \text{Ex. 47.} \quad \begin{array}{r|l} & 4 \\ 4 & 15 \\ 3 & 5 \\ \hline 231 & 1728 \\ \hline 77 & 14400 \\ \hline \end{array} \\ 187 \frac{1}{7} \text{ gal., Ans.} \end{array}$$

$$\begin{array}{r} \text{Ex. 48.} \quad \begin{array}{r|l} & 300 \\ 96 & 112 \\ \hline \end{array} \\ \$350, \text{ Ans.} \end{array}$$

$$\begin{array}{r} \text{Ex. 49.} \quad \begin{array}{r|l} & 300 \\ 72 & 112 \\ \hline 3 & 1400 \\ \hline \end{array} \\ \$466.66 \frac{2}{3}, \text{ Ans.} \end{array}$$

$$\begin{array}{r} \text{Ex. 50.} \quad \begin{array}{r|l} & 300 \\ 90 & 112 \\ \hline 3 & 1120 \\ \hline \end{array} \\ \$373.33 \frac{1}{3}, \text{ Ans.} \end{array}$$

$$\begin{array}{r} \text{Ex. 51.} \quad \begin{array}{r|l} & 300 \\ 56 & 112 \\ \hline \end{array} \\ \$600, \text{ Ans.} \end{array}$$

$$\begin{array}{r} \text{Ex. 52.} \quad \begin{array}{r|l} & 300 \\ 60 & 112 \\ \hline \end{array} \\ \$560, \text{ Ans} \end{array}$$

Ex. 53.  $\frac{13}{2} \times \$\frac{64}{72} = \$5.777$

$$\frac{12}{1} \times \frac{45}{72} = 7.50$$

$$\frac{33}{4} \times \frac{19}{72} = 2.177$$

$$\frac{9}{1} \times \frac{9}{72} = 1.125$$

$$\frac{9}{2} \times \frac{17}{72} = 1.0625$$

$$\frac{27}{4} \times \frac{44}{72} = 4.125$$

---

\$21.76+, *Ans.*

Ex. 54.  $(22 \times 130) \div 110 = 26$ , *Ans.*

Ex. 55.  $1000 \times \frac{1}{1728} \times \frac{231}{1} = 133\frac{49}{72}$  oz. = 8 lb.  $5\frac{49}{72}$  oz., *Ans.*

Ex. 56.  $\frac{45 \times 44 \times 144}{4 \times 5 \times 500} = \frac{14256}{500} = 28\frac{64}{125}$ , *Ans.*

Ex. 57.  $\frac{9}{2} \times \frac{9}{2} \times \frac{6}{1} \times \frac{1728}{1} \times \frac{1}{231} \times \frac{1}{63}$   
 $= \frac{7776}{539} = 14\frac{230}{539}$  hhd., *Ans.*

Ex. 58. 18 ft. 9 in. = 225 in.;  $225 \text{ in.} \times 3 = 675 \text{ in. per sec.}$   
 $\frac{150 \times 63360}{875} = 14080 \text{ sec.} = 3 \text{ h. } 54 \text{ min. } 40 \text{ sec.}$ , *Ans.*

Ex. 59. He had come from the East, because his watch showed later time;  
 and 1 h. 6 min. 52 sec.  $\times 15 = 16^\circ 43'$ , *Ans.*

Ex. 60.  $\frac{17}{2} \times \frac{17}{4} \times \frac{15}{4} \times \frac{1728}{1} \times \frac{10}{21504}$   
 $= \frac{195075}{1792} = 108\frac{1539}{1792}$  bu., *Ans.*

Ex. 61. 3 hhd. 9 gal. 3 qt. = 198.75 wine gal.;  
 $198.75 \times 231 = 45911.25$  cu. in.;  
 $45911.25 \div 277.274 = 165.5807$  + Imperial gal., *Ans*

Ex. 62.  $105.85 \text{ ch.} \times 40.15 \text{ ch.} = 4249.8775 \text{ sq. ch.}$   
 $= 424.98775 \text{ A.}$ , *Ans.*

Ex. 63. Since A has  $\frac{7}{12}$  of the farm, B must own  $\frac{5}{12}$ ; and  
 $\frac{7}{12} - \frac{5}{12} = \frac{1}{6}$ , the difference between their shares, which  
 is 15 A. 1 R.  $28\frac{1}{2}$  P. Hence 15 A. 1 R.  $28\frac{1}{2}$  P.  
 $\times 6 = 92 \text{ A. } 2 \text{ R. } 11 \text{ P.}$ , whole farm;  $92 \text{ A. } 2 \text{ R.}$   
 $11 \text{ P.} \div 12 = 7 \text{ A. } 2 \text{ R. } 34\frac{1}{4} \text{ P.}$ ,  $\frac{1}{12}$  of farm;  $7 \text{ A.}$   
 $2 \text{ R. } 34\frac{1}{4} \text{ P} \times 5 = 38 \text{ A. } 2 \text{ R. } 11\frac{1}{4} \text{ P.}$ , B's share, *Ans.*

Ex. 64.  $41 \times 40 \times \frac{1}{100} = 16.40$  squares in both sides;  
 $\$3.40 \times 16.40 = \$55.76$ , *Ans.*

Ex. 65.  $189.5 \times 150 = 28425$  sq. rd.  $= 177.65625$  A.;  
 $\$31.75 \times 177.65625 = \$5640.58+$ , *Ans.*

Ex. 66.  $9.75$  tons  $\times 50 = 487.5$  cu. ft.; and since every cubic foot will make 12 square feet of inch stuff,  
 $487.5$  cu. ft.  $\times 12 = 5850$  sq. ft. boards, *Ans.*

Ex. 67.  $\frac{4}{1} \times \frac{7}{2} \times \frac{20}{7} \times \frac{1728}{1} \times \frac{1}{231} = \frac{23040}{77} = 299\frac{17}{77}$  gal., *Ans.*

Ex. 68.  $\frac{128}{1} \times \frac{1}{12} \times \frac{2}{7} = \frac{64}{21} = 3\frac{1}{21}$  ft., *Ans.*

Ex. 69.  $\frac{32}{1} \times \frac{18}{1} \times \frac{25}{2} \times \frac{1}{60} \times \frac{1}{10} = 12$  min, *Ans.*

Ex. 70. Since the lots are to be *square*, the side of one must be a common measure of the two dimensions of the land. The greatest common divisor of  $201\frac{2}{3}$  rods and  $41\frac{1}{4}$  rods is  $\frac{55}{12}$  rods, which is the length of one side of the required lots. Now, if we divide the piece of land, by running lines both crosswise and lengthwise, at a distance asunder of  $\frac{55}{12}$  rods, we shall have  $41\frac{1}{4} \div \frac{55}{12} = 9$  ranges of lots, and  $201\frac{2}{3} \div \frac{55}{12} = 44$  lots in each range. Hence  $44 \times 9 = 396$  lots, *Ans.*

Ex. 71. The quantity of land in each of the equal lots must be the greatest common divisor of the quantities in the several pieces. Hence,

4 A. 3 R. 20 P. = 780 P.	4	780 .. 1092 .. 1560 .. 1872
6 " 3 " 12 " = 1092 "	3	195 .. 273 .. 390 .. 468
9 " 3 " = 1560 "	13	65 .. 91 .. 130 .. 156
11 " 2 " 32 " = 1872 "		5 .. 7 .. 10 .. 12
		$4 \times 3 \times 13 = 156$ P., <i>Ans.</i>

## DUODECIMALS

## ADDITION AND SUBTRACTION.

(388, page 227.)

Ex. 4. 50 sq. yd. 1 sq. ft. 7' 4"

62 " 0 " 5' 3"

48 " 2

42 " 2 " 3' 4"

---

202 sq. yd. 6 sq. ft. 3' 11", area of the walls;

300 sq. yd. 2 sq. ft. 5' , whole area;

---

97 sq. yd. 5 sq. ft. 1' 1", Ans.

## MULTIPLICATION.

(390, page 228.)

Ex. 1 18 ft.

5'

Ex. 2. 23 ft.

7'

16 ft.

8'

3 "

8'

---

12

3' 4"

---

15

8' 8"

294

8'

---

70

9'

---

306 sq. ft. 11' 4", Ans.

---

86 sq. ft. 5' 8"

4 ft.

---

345 cu. ft. 10' 8"=

2 Cd. 5 cd. ft. 9 cu. ft. 10' 8", Ans

(227, 228)



Ex. 3.      79 ft.      8'  
             38 "      11'

---

8 sq. yd.   1 sq. ft. 0' 4''  
336        "       3       4'

---

344 sq. yd.   4 sq. ft. 4' 4'', *Ans.*

Ex. 4. 7 ft.      6'  
             3 "      3'

---

1 sq. ft. 10' 6''  
22        "       6'

---

24 sq. ft. 4' 6''  
1 ft.      10'

---

20 cu. ft. 3' 9''  
24        "       4' 6''

---

44 cu. ft. 8' 3'', *Ans.*

Ex. 5.   56 ft.  $\times$  7 = 392 ft., entire length; 392 ft.  $\times$  11'  $\times$  10'  
             = 43120'' = 299 cu. ft. 5' 4'', *Ans.*

Ex. 6.      60 ft.      6'  
             40 "      3'

---

100 ft.      9'  
                 2

---

201 ft.      6'  
22 "

---

4433 sq. ft.,    in walls;  
2924        "    2'    " roof;  
523        "    3'    " gables;

---

7880 sq. ft. 5', *Ans.*

24 ft.      2'  
                 2

---

48 ft.      4'  
60 "      6'

---

24 ft.      2'  
2895 "

---

2924 sq. ft. 2'

## CONTRACTED METHOD.

(391, page 229.)

**Ex. 1.** 7 ft. 3' 4'' 5'''

6'' 8' 5ft.

---

36 5'

4 10'

4'

---

41 ft. 7'±, *Ans.***Ex. 3.** 6 ft. 2' 7''

4'' 3' 3 ft.

---

18 8'

1 7'

2'

---

20 ft. 5'±

6'' 8' 2 ft.

---

40 10'

13 7'

10'

---

55 cu. ft. 3'±, *Ans.***Ex. 2.**

36 ft. 9' 4''

9'' 6'' 26 ft.

---

106 sq. yd. 2 ft. 3'

2 " 0 " 5'

2 " 3'

---

*Ans.* 108 sq. yd. 4 ft. 11'±**Ex. 4.** 7 ft. 6' 8''

11'' 2' 3 ft.

---

22 8'

1 3'

7'

---

24 ft. 6'±

4'' 8' 3 ft.

---

73 6'

16 4'

8'

---

90 ft. 6'±, *Ans.*

(229, 230)

## DIVISION.

(392, page 230.)

Ex. 1. 17 ft.) 287 ft. 7' (16 ft. 11', *Ans.*

17

---

117

102

---

15 ft. 7'

15 " 7'

Ex. 2. 6 ft. 8') 29 ft. 5' 4" (4 ft. 5', *Ans.*

26 " 8'

---

2 ft. 9' 4"

2 " 9' 4"

Ex. 3. 48 ft. 6') 1176 ft. 1' 6" (24 ft. 3', *Ans.*

1164 "

---

12 ft. 1' 6"

12 " 1' 6"

Ex. 4.

38 ft. 10' 362 ft. 5' 4") 275 cu. yd. 5 cu. ft. 1' 4" =

9 ft. 4' 362 ft. 5' 4") 7430 cu. ft. 1' 4" (20 ft. 6', *Ans.*

7248 cu. ft. 10' 8"

---

12 11" 4"

349 6'

---

181 cu. ft. 2' 8"

181 cu. ft. 2' 8"

---

362 ft. 5' 4"

(230, 231)

## CONTRACTED METHOD.

(393, page 231.)

Ex. 1. 2 ft. 10' 7") 7 ft. 7' 3" (2 ft. 7' 8"  $\pm$ , *Ans.*

5 " 9' 2"

---

1 ft. 10' 1"

1 ft. 8' 2"

---

1' 11"

---

1' 11"

Ex. 2.

7 ft. 2' 4" 33 ft. 5' 6") 64 ft. 9' 8" (1 ft. 11' 3"  $\pm$ , *Ans.*

8''' 9'' 7' 4 ft.

33 " 5' 6"

---

28 9' 4"

---

31 ft. 4' 2"

4 2' 4"

30 " 8' 1"

5' 5"

5"

---

8' 1"

8' 4"

---

33 ft. 5' 6"  $\pm$ Ex. 3. 7 ft. 2' 11") 36 ft. 4' 8" (5 ft. 3' 7'''  $\pm$ , *Ans.*

36 ft. 2' 7"

---

2' 1"

1' 9"

---

4"

4"

---

—

(231)

## SHORT METHODS.

FOR SUBTRACTION.

(395, page 232.)

Ex. 1. 1000

$$\begin{array}{r} 1000 \\ 756 \\ \hline \end{array}$$
244, *Ans.*

Ex. 3. 10.0000

$$\begin{array}{r} 10.0000 \\ .5768 \\ \hline \end{array}$$
9.4232, *Ans.*

Ex. 5. 64000.00000

$$\begin{array}{r} 64000.00000 \\ 90.59876 \\ \hline \end{array}$$
63909.40124, *Ans.*

Ex. 7. 1000

$$\begin{array}{r} 1000 \\ 271 \\ \hline \end{array}$$

729;

100000

$$\begin{array}{r} 100000 \\ 18365 \\ \hline \end{array}$$

81635;

10000000

$$\begin{array}{r} 10000000 \\ 3401250 \\ \hline \end{array}$$
6598750, *Ans.*

Ex. 2. 4000000

$$\begin{array}{r} 4000000 \\ 8576 \\ \hline \end{array}$$
3991424, *Ans.*

Ex. 4. 1700000

$$\begin{array}{r} 1700000 \\ 13057 \\ \hline \end{array}$$
1686943, *Ans.*

Ex. 6. 1000000

$$\begin{array}{r} 1000000 \\ 599948 \\ \hline \end{array}$$
400052, *Ans.*

FOR MULTIPLICATION.

(396, page 233.)

Ex. 1. 78400

$$\begin{array}{r} 78400 \\ 784 \\ \hline \end{array}$$
77616, *Ans.*

Ex. 3. 478300000

$$\begin{array}{r} 478300000 \\ 4783 \\ \hline \end{array}$$
478295217, *Ans.*

Ex. 2. 5873.000

$$\begin{array}{r} 5873.000 \\ 5873 \\ \hline \end{array}$$
5867.127, *Ans.*

Ex. 4. 75000.000

$$\begin{array}{r} 75000.000 \\ 75 \\ \hline \end{array}$$
74999.925, *Ans.*

(232, 233)



(397, page 233.)

$$\begin{array}{r} \text{Ex. 1. } 78600 \\ 1572 \\ \hline 77028, \text{ Ans.} \end{array}$$

$$\begin{array}{r} \text{Ex. 2. } 432700 \\ 17308 \\ \hline 415392, \text{ Ans} \end{array}$$

$$\begin{array}{r} \text{Ex. 3. } 7328000 \\ 21984 \\ \hline 7306016, \text{ Ans.} \end{array}$$

$$\begin{array}{r} \text{Ex. 4. } 7873586000 \\ 39367930 \\ \hline 78342.18070, \text{ Ans.} \end{array}$$

$$\begin{array}{r} \text{Ex. 5. } 437890000 \\ 262734 \\ \hline 437627266, \text{ Ans.} \end{array}$$

$$\begin{array}{r} \text{Ex. 6. } 7077364000000 \\ 49541548 \\ \hline 7077314.458452, \text{ Ans.} \end{array}$$

(398, page 234.)

$$\begin{array}{r} \text{Ex. 1. } 567 \times 13 \\ \hline 7371, \text{ Ans.} \end{array}$$

$$\begin{array}{r} \text{Ex. 2. } 439603 \times 10.5 \\ \hline 4615831.5, \text{ Ans.} \end{array}$$

$$\begin{array}{r} \text{Ex. 3. } 7859 \times 107 \\ \hline 840913, \text{ Ans.} \end{array}$$

$$\begin{array}{r} \text{Ex. 4. } 18075 \times 1008 \\ \hline 18219600, \text{ Ans.} \end{array}$$

$$\begin{array}{r} \text{Ex. 5. } 3907 \times 10.002 \\ \hline 39077.814, \text{ Ans.} \end{array}$$

(399, page 235.)

$$\begin{array}{r} \text{Ex. 1. } 56783 \times 71 \\ \hline 4031593, \text{ Ans.} \end{array}$$

$$\begin{array}{r} \text{Ex. 2. } 47.89 \times 60.1 \\ \hline 2878.189, \text{ Ans.} \end{array}$$

$$\begin{array}{r} \text{Ex. 3. } 3724.5 \times .901 \\ \hline 3355.7745, \text{ Ans.} \end{array}$$

$$\begin{array}{r} \text{Ex. 4. } 103078 \times 40001 \\ \hline 4123223078, \text{ Ans.} \end{array}$$

(400, page 236.)

Ex. 1.  $432711000$

$432711$

$9)432278289$

$48030921$

$2$

$96061842, \text{Ans.}$

Ex. 3.  $673200000$

$6732$

$9)673193268$

$74799252$

$8$

$59.8394016, \text{Ans.}$

Ex. 2.  $5780000$

$578$

$9)5779422$

$642158, \text{Ans.}$

Ex. 4.  $8675000$

$8675$

$9)8666325$

$962925$

$7$

$674047.5, \text{Ans.}$

Ex. 5.  $4444400000$

$44444$

$9)4444355556$

$493817284$

$8$

$3950538272, \text{Ans.}$

(401, page 237.)

Ex. 1.  $24 \times 30 + 3^2 = 729, \text{Ans.}$

Ex. 2.  $48 \times 50 + 1^2 = 2401, \text{Ans.}$

Ex. 3.

$28^2 = 26 \times 30 + 2^2 = 784$

$26^2 = 22 \times 30 + 4^2 = 676$

$39^2 = 38 \times 40 + 1^2 = 1521$

$38^2 = 36 \times 40 + 2^2 = 1444$

$37^2 = 34 \times 40 + 3^2 = 1369$

$36^2 = 32 \times 40 + 4^2 = 1296$

$35^2 = 30 \times 40 + 5^2 = 1225.$

(236, 237)

Ex. 4.

$$77^2 = 74 \times 80 + 3^2 = 5929; \quad 88^2 = 86 \times 90 + 2^2 = 7744;$$

$$8.6^2 = 8.2 \times 9.0 + .4^2 = 73.96;$$

$$99^2 = 98 \times 100 + 1^2 = 9801; \quad 98^2 = 96 \times 100 + 2^2 = 9604;$$

$$69^2 = 68 \times 70 + 1^2 = 4761; \quad 68^2 = 66 \times 70 + 2^2 = 4624;$$

$$6.7^2 = 6.4 \times 7.0 + .3^2 = 44.89; \quad 62^2 = 60 \times 64 + 2^2 = 3844.$$

(403, page 237.)

Ex. 1.  $43700 \div 4 = 10925$ , *Ans.*

Ex. 2.  $68720 \div 4 = 17180$ , *Ans.*

Ex. 3.  $5734154000 \div 3 = 1911384666\frac{2}{3}$ , *Ans.*

Ex. 4.  $75864200 \div 8 = 9483025$ , *Ans.*

Ex. 5.  $78563000 \div 8 = 9820375$ , *Ans.*

Ex. 6.  $57687000 \div 7 = 8241000$ , *Ans.*

(404, page 238.)

Ex. 1.  $43789 \times 100 \times 8\frac{1}{4} = 36125925$ , *Ans.*

Ex. 2.  $58730 \times 1000 \times 7\frac{1}{8} = 418451250$ , *Ans.*

Ex. 3.  $7854 \times 34\frac{1}{4} = 268999.5$ , *Ans.*

Ex. 4.  $30724 \times 10000 \times 7\frac{1}{3} = 2253093333\frac{1}{3}$ , *Ans.*

Ex. 5.  $47836 \times 100 \times 7\frac{1}{8} = 34083150$ , *Ans.*

Ex. 6.  $53727 \times 100 \times 24\frac{1}{8} = 129840250$ , *Ans.*

(405, page 239.)

Ex. 1.  $\$568 \div 4 = \$142$ , *Ans.*

Ex. 2.  $\$51 \div 6 = \$8.50$ ;  $33 \times 8 = 264$  yd.;  $\$264 \div 16 =$   
 $\$16.50$ ;  $\$18 \div 3 = \$6$ ;  $\$8.50 + \$16.50 = \$25$ ;  
 $\$25 - \$6 = \$19$ , *Ans.*

Ex. 3.  $\$28 \div 8 = \$3.50$ , *Ans.*

Ex. 4.  $\$576 \div 9 = \$64$ , *Ans.*

Ex. 5.  $\$7.875 \div 63 = \$.125 = \$\frac{1}{8}$ , gain on 1 gal.;  
 $\$576 \div 8 = \$72$ , *Ans.*

(237-239)

(406, page 241.)

Ex. 2.    \$15.46  
              46

---

\$711.16, cost of 3 lb. 10 oz.=46 oz.;

.773    "    "    1 pwt.= $\frac{1}{20}$  of 1 oz.;

5.411    "    "    7    "

.129    "    "    4 gr.= $\frac{1}{8}$  of 1 pwt.;

.032    "    "    1    "

.016    "    "     $\frac{1}{2}$     "

---

\$717.521, *Ans.*

Ex. 3. 90 lb.=.9 cwt.; \$.56 $\times$ 5.9=\$3.304, *Ans.*

Ex. 4.    \$4.48  
              3

---

\$13.44, cost of 3 bu.;

1.12    "    "    1 pk.= $\frac{1}{4}$  bu.;

.14    "    "    1 qt.= $\frac{1}{8}$  pk.;

28    "    "    2    "

---

\$14.98, *Ans.*

Ex. 5.    8 lb.    5 oz.    6.74 dr.  
                                  5

---

41 lb. 11 oz. 1.7 dr., weight of 5 gal.;

2    "    1    "    5.685    "    "    "    1 qt.= $\frac{1}{4}$  gal.;

4    "    2    "    11.37    "    "    "    2    "

1    "    0    "    10.842+    "    "    "    1 pt.= $\frac{1}{2}$  qt.;

4    "    2.71    "    "    "    "    1 gi.= $\frac{1}{4}$  pt.;

8    "    5.42    "    "    "    "    2    "

---

49 lb. 12 oz. 5.73—dr., *Ans.*

Ex. 6. \$17.50  
3

---

\$52.50 , cost of 3 A.;  
 4.375, " " 1 R.;  
 .547, " " 5 P= $\frac{1}{8}$  R.;  
 3.282, " " 30 P.;  
 .043, " " .4 P= $\frac{1}{100}$  R.;

---

\$60.747—, *Ans.*

Ex. 7. £3 17 s. 10.5 d.  
7

---

£27 5 s. 1.5 d., val. of 7 oz.;  
 1 18 " 11.25 " " " 10 pwt= $\frac{1}{2}$  oz.;  
 19 " 5.625 " " " 5 "  
 3 " 10.725 " " " 1 "  
 1 " 11.3625 " " " 12 gr.= $\frac{1}{2}$  pwt.;  
 11.68125 " " " 6 " = $\frac{1}{2}$  of 12 gr.;

---

£30 10 s. 4.14375 d., *Ans.*

Ex. 8 4° 36' 40"  
5

---

23° 3' 20'', in 5 da.;  
 2° 18' 20'', " 12 h.= $\frac{1}{2}$  da.;  
 34' 35'', " 3 "  
 5' 45 $\frac{5}{8}$ '', " 30 min.= $\frac{1}{6}$  of 3 h.;  
 23 $\frac{1}{18}$ '', " 2 "  
 5 $\frac{5}{72}$ '', " 30 sec.= $\frac{1}{4}$  of 2 min.;  
 2 $\frac{127}{144}$ '', " 15 "  
 1 $\frac{199}{216}$ '', " 10 "

---

26° 2' 34 $\frac{197}{32}$ '', *Ans.*



Ex. 9. 7 gal. 1 qt. 1 pt. 3 gi.=7.46875 gal.;

hence, \$7.46875, cost at 8 s.;

\$3.734375, " " 4 s.;

.622395+, " " 8 d.;

\$4.35+, *Ans.*

Ex. 10. \$12.50 , at 6 s. per day;

\$ 2.083+, " 1 s. " "

\$10.416+, " 5 s. " "

.521—, " 3 d. " "

\$10.93+, *Ans.*

## FOR DIVISION.

(407, page 242.)

Ex. 1.  $634.75 \times 4 = 2539$ , *Ans.*

Ex. 2.  $785.6 \times 8 = 6284.8$ , *Ans.*

Ex. 3.  $5.16 \times 3 = 15.48$ , *Ans.*

Ex. 4.  $.167324 \times 8 = 1.338592$ , *Ans.*

Ex. 5.  $1748 \times 7 = 12236$ , *Ans.*

Ex. 6.  $57.634 \times 6 = 345.804$ , *Ans.*

(408, page 243.)

Ex. 1. 2575 ) 64375

4                      4

103/00 ) 2575/00 (25, *Ans.*

206

515

515

(241—243)

Ex. 2.      3625 ) 76394  
              8            8  


---

 29/000 ) 611/152 ( $21\frac{269}{3625}$ , *Ans.*  
              58  


---

              31  
              29  


---

              2152 ÷ 8 = 269

Ex. 3.      433 $\frac{1}{3}$  ) 7325  
              3            3  


---

 13/00 ) 219/75 ( $16\frac{47}{52}$ , *Ans.*  
              13  


---

              89  
              78  


---

              1175 × 4 = 47/00  
              1300 × 4 = 52/00

Ex. 4.      431.25 ) 5736  
              8            8  


---

 3450            45888  
              2            2  


---

 69/00 ) 917/76 ( $13\frac{173}{576}$ , *Ans.*  
              69  


---

              227  
              207  


---

              2076 ÷ 12 = 173

$$\begin{array}{r} \text{Ex. 5.} \quad 566\frac{2}{3} \quad ) \quad 42.75 \\ \quad \quad \quad \underline{3} \quad \quad \quad \underline{3} \\ 17/00 \quad ) \quad 128/.25 \quad (.07\frac{37}{88}, \text{ Ans.} \\ \quad \quad \quad \underline{119} \end{array}$$

$$\begin{array}{l} 9.25 \times 4 = 37 \\ 17.00 \times 4 = 68 \end{array}$$

$$\begin{array}{r} \text{Ex. 6.} \quad .21875 \quad ) \quad 24409375 \\ \quad \quad \quad \underline{8} \quad \quad \quad \underline{8} \\ 1.75 \quad \quad \quad 195275000 \\ \quad \quad \quad \underline{4} \quad \quad \quad \underline{4} \\ 7 \quad \quad \quad )781100000 \\ \quad \quad \quad \underline{111585714\frac{2}{7}}, \text{ Ans.} \end{array}$$

$$\begin{array}{r} \text{Ex. 7.} \quad 3.14\frac{2}{7} \quad ) \quad 785 \\ \quad \quad \quad \underline{7} \quad \quad \quad \underline{7} \\ 22 \quad \quad \quad 4095 \\ \quad \quad \quad \underline{249\frac{17}{22}}, \text{ Ans.} \end{array}$$

## RATIO.

(421, page 246.)

$$\text{Ex. 2.} \quad \frac{6}{42} = \frac{1}{7}, \text{ Ans.}$$

$$\text{Ex. 3.} \quad \frac{80}{120} = \frac{2}{3}, \text{ Ans.}$$

$$60$$

$$\text{Ex. 4.} \quad \frac{84}{12} = 7, \text{ Ans.}$$

$$\text{Ex. 5.} \quad 2\frac{6}{1} \times 1\frac{3}{7} = 48\frac{2}{7}, \text{ Ans}$$

$$\text{Ex. 6.} \quad 2\frac{1}{2} \div 7\frac{1}{8} = \frac{5}{2} \times \frac{8}{57} = \frac{20}{57}, \text{ Ans.}$$

$$\text{Ex. 7.} \quad \frac{7}{10} \div \frac{1}{6} = \frac{7}{10} \times \frac{6}{1} = 4\frac{1}{5}, \text{ Ans.}$$

$$\text{Ex. 8.} \quad 1 \text{ mi.} = 8 \text{ fur} ; \frac{3}{8}, \text{ Ans.}$$

(243—246)

Ex. 9. 1 wk. 3 da. 12 h.=252 h.; 9 wk.=1512 h.;  
 $1512 \div 252 = 6$ , *Ans.*

Ex. 10. 10 A. 1 R. 20 P.=1660 P.;  
 6 A. 2 R. 30 P.=1070 P.;  
 $1070 \div 1660 = \frac{107}{166}$ , *Ans.*

Ex. 11. 25 bu. 2 pk. 6 qt.=822 qt.;  
 40 bu. 4.5 pk.=1316 qt.;  $1316 \div 822 = 1\frac{247}{411}$ , *Ans.*

Ex. 12.  $18\frac{3}{4}^\circ = 67500''$ ;  $45' 30'' = 2730''$ ;  
 $\frac{2730}{67500} = \frac{91}{2250}$ , *Ans.*

Ex. 13.  $\frac{\frac{2}{3} \times \frac{3}{4}}{\frac{1}{2}} \div \frac{12\frac{1}{2}}{\frac{4}{7}} = \frac{2}{3} \times \frac{3}{4} \times \frac{2}{1} \times \frac{4}{7} \times \frac{2}{25} = \frac{8}{175}$ , *Ans.*

Ex. 14.  $\frac{5}{8} \times \frac{3}{10} \times \frac{3}{4} \times \frac{1}{13} \times \frac{7}{8} \times \frac{2}{25} = \frac{639}{64000}$ , *Ans.*

Ex. 15.  $42 \div 28 = 1\frac{1}{2}$ , *Ans.* (See **415**.)

Ex. 16. 43 gal.=172 qt.;  $\frac{3}{172}$ , *Ans.*

Ex. 17.  $15 \times \frac{4}{5} = 12$ , *Ans.*

Ex. 18.  $3\frac{1}{4} \div 7 = \frac{13}{28}$ , *Ans.*

Ex. 19.  $.75 \div (\frac{1}{2} \times \frac{5}{8}) = \frac{75}{100} \times \frac{2}{1} \times \frac{8}{5} = 2\frac{2}{5}$ , *Ans.*

Ex. 20.  $\$6.125 \div 25 = \$.245$ , *Ans.*

Ex. 21.  $\frac{3}{5} \times \frac{1}{6} = \frac{1}{10}$ , *Ans.*

Ex. 22. 13 A. 3 R. 25 P.  $\times \frac{42}{89} = 6$  A. 2 R. 10 P., *Ans.*

## PROPORTION.

(428, page 248.)

Ex. 1. (?) =  $\frac{26 \times 10}{4} = 65$ , *Ans.*

Ex. 2. (?) =  $\frac{16 \text{ A.} \times 8865}{720} = 197 \text{ A.}$ , *Ans.*

(246—248)

$$\text{Ex. 3. } (?) = \frac{4\frac{1}{2} \text{ yd.} \times 29.25}{9.75} = 13\frac{1}{2} \text{ yd., Ans.}$$

$$\begin{aligned} \text{Ex. 4. } 21 \text{ A. } 3 \text{ R. } 20 \text{ P.} &= 3500 \text{ P.;} \\ (?) &= \frac{3500 \text{ P.} \times 1260}{750} = 5880 \text{ P.} = 36 \text{ A. } 3 \text{ R., Ans.} \end{aligned}$$

$$\text{Ex. 5. } (?) = \frac{10\frac{6}{8} \text{ oz.} \times 7\frac{50}{1} \times \frac{1}{18}}{1} = 21\frac{17}{8} \text{ oz., Ans.}$$

$$\begin{aligned} \text{Ex. 6. } £407 \text{ 2s. } 10\frac{2}{7}\text{d.} &= £407\frac{1}{7} = £2\frac{850}{7}; \\ (?) &= 7 \text{ oz.} \times \frac{2\frac{850}{7}}{30} \times \frac{1}{30} = 95 \text{ oz.} = 7 \text{ lb. } 11 \text{ oz., Ans.} \\ &\quad .15 \text{ hhd.} \times 2.39 \end{aligned}$$

$$\text{Ex. 7. } (?) = \frac{\quad}{.3585} = 1 \text{ hhd., Ans.}$$

$$\begin{aligned} \text{Ex. 8. } 1 \text{ T. } 7 \text{ cwt. } 3 \text{ qr. } 20 \text{ lb.} &= 3128 \text{ lb.;} \\ 13 \text{ T. } 5 \text{ cwt. } 2 \text{ qr.} &= 29736 \text{ lb.;} \\ (?) &= \frac{\$9.50 \times 29736}{3128} = \$70\frac{905}{1564}, \text{ Ans.} \end{aligned}$$

$$\text{Ex. 9. } (?) = \$175.35 \times \frac{3}{7} \times \frac{8}{1} = \$601.20, \text{ Ans.}$$

$$\begin{aligned} \text{Ex. 10. } \$12\frac{1}{2} &= \$2\frac{5}{2}; 240\frac{1}{7} = 16\frac{81}{7}; 149\frac{177}{1127} = 1\frac{88100}{1127}; \\ (?) &= \$2\frac{5}{2} \times 16\frac{81}{7} \times \frac{1127}{168100} = \$20\frac{1}{8}, \text{ Ans.} \end{aligned}$$

$$\text{Ex. 11. } \frac{3}{5} \text{ yd.} \times \frac{590625}{100000} \times \frac{8}{7} = 40\frac{1}{2} \text{ yd., Ans.}$$

## SIMPLE PROPORTION.

(436, page 252.)

$$\begin{aligned} \text{Ex. 1. } 12 \text{ gal.: } 63 \text{ gal.} &= \$30 : (?) \\ (?) &= \frac{\$30 \times 63}{12} = \$157.50, \text{ Ans.} \end{aligned}$$

$$\begin{aligned} \text{Ex. 2. } 9 \text{ bu.: } 100 \text{ bu.} &= 2 \text{ bar.: } (?) \\ &\quad 2 \text{ bar.} \times 100 \\ (?) &= \frac{\quad}{9} = 22\frac{2}{9} \text{ bar., Ans.} \end{aligned}$$



Ex. 3. \$26.75—\$22.25=\$4.50, gain on 18 bu.;

$$18 \text{ bu.} : 240 \text{ bu.} = \$4.50 : (?)$$

$$(?) = \$\frac{4.50 \times 240}{18} = \$60, \text{ Ans.}$$

Ex. 4.  $6\frac{1}{2}$  bu. :  $9\frac{1}{4}$  = \$3 : (?)

$$(?) = \$3 \times \frac{3}{4} + \frac{2}{1} = \$4.269+, \text{ Ans.}$$

Ex. 5.  $1\frac{3}{4}$  yd. :  $87\frac{1}{2}$  yd. = \$.42 : (?)

$$(?) = $.42 \times \frac{175}{2} \times \frac{4}{7} = \$21, \text{ Ans.}$$

Ex. 6.  $\$1500 \times \frac{1000}{275.40} = \$5446.62+, \text{ Ans.}$

Ex. 7.  $\frac{4}{5}$  of 15 da. = 12 da.; and since the number of men required will vary inversely as the time, 20 men  $\times \frac{15}{12} = 25$  men required to perform the work in 12 days; 25 men—20 men = 5 men to be added.

Ex. 8. 100 yd. : 3.25 yd. = \$473.07  $\frac{9}{13}$  : (?)

$$\$6\frac{150}{13} \times \frac{13}{4} \times \frac{1}{100} = \$15.375, \text{ Ans.}$$

Ex. 9. 1 lb. 4 oz. 10 pwt. = 330 pwt.;

$$330 \text{ pwt.} : (?) = \$260.70 : \$39.50$$

$$330 \text{ pwt.} \times 260.70$$

$$(?) = \frac{\quad}{39.50} = 2 \text{ oz. 10 pwt., Ans.}$$

Ex. 10. 1 h. 14 min.  $\times \frac{54}{24} = 2 \text{ h. 46 min. 30 sec., Ans.}$

Ex. 11.  $\$1\frac{12}{5} : \$\frac{7}{20} = \frac{4}{5} \text{ bu.} : (?)$ ;

$$(?) = \frac{4}{5} \text{ bu.} \times \frac{7}{20} \times \frac{25}{12} = \frac{7}{12} \text{ bu., Ans.}$$

Ex. 12. 46 A. 3 R. 14 P. = 7494 P.; 35 A. 2 R. 10 P.

$$= 5690 \text{ P.; } \$374.70 \times \frac{5690}{7494} = \$284.50, \text{ Ans.}$$

Ex. 13. 1 yr. 3 mo. = 15 mo.; 2 yr. 8 mo. = 32 mo.;

$$\$1870.65 \times \frac{32}{15} = \$3990.72, \text{ Ans.}$$

Ex. 14.  $164.5 \times \frac{7\frac{1}{2}}{5} = 246.75, \text{ Ans.}$

Ex. 15. 12 A. 3 R. 36 P. = 2076 P.;

$$2076 \text{ P.} \times \frac{132}{16} = 17127 \text{ P.} = 107 \text{ A. 7 P., Ans.}$$

Ex. 16.  $\$325 : \$2275 = \$26.32 : (?)$ ;

$$(\$?) = \frac{\$26.32 \times 2275}{325} = \$184.24, \text{ Ans.}$$

Ex. 17  $60.5 \times 44 = 2662 \text{ sq. ft.} = 295\frac{7}{9} \text{ sq. yd.}$ ;

$$14\frac{1}{4} \text{ sq. yd.} : 295\frac{7}{9} \text{ sq. yd.} = \$34\frac{1}{5} : (?)$$
;

$$(\$?) = \$17\frac{1}{5} \times \frac{2662}{9} \times \frac{4}{57} = \$709.86\frac{2}{3}, \text{ Ans.}$$

Ex. 18. 1 doz. = 12;  $10\frac{3}{4} \text{ gross} = 1548$ ;

$$\$0.0625 \times \frac{1548}{12} = \$8.06\frac{1}{4}, \text{ Ans.}$$

Ex. 19. 7 s. 6 d. =  $7\frac{1}{2} \text{ s.} = \frac{15}{2} \text{ s.}$ ; and since the weight of the loaf should vary inversely as the price of wheat, we

have  $7\frac{1}{2} \text{ s.} : 6 \text{ s.} :: (?) : 9 \text{ oz.}$ ;

$$(\$?) = 9 \text{ oz.} \times \frac{15}{2} \times \frac{1}{6} = 11\frac{1}{4} \text{ oz., Ans.}$$

COMPOUND PROPORTION.

(439, page 256.)

Ex. 1.  $\begin{cases} 12 \\ 5 \end{cases} : \begin{cases} (?) \\ 18 \end{cases} = 11 : 33$   $\begin{array}{c|c} (?) & 12 \\ 18 & 5 \\ 11 & 33 \end{array}$

$$(\$?) = 10, \text{ Ans.}$$

Ex. 2.  $40 \text{ da.} \times \frac{300}{480} \times \frac{24}{48} = 12\frac{1}{2} \text{ da., Ans.}$

Ex. 3.

$$\begin{cases} 7 \\ 12 \end{cases} : \begin{cases} 16 \\ (?) \end{cases} = 1260 : 4728 \quad \begin{array}{c|c} 16 & 7 \\ (?) & 12 \\ 1260 & 4728 \end{array}$$

$$\begin{array}{c|c} 10 & 197 \end{array}$$

$$(\$?) = 19.7 \text{ da., Ans.}$$

Ex. 4.  $\left\{ \begin{array}{l} 144 \\ 6 \\ 12 \end{array} \right. : \left\{ \begin{array}{l} 30 \\ (?) \\ 7 \end{array} \right. = \left\{ \begin{array}{l} 200 \\ 3 \\ 2 \end{array} \right. : \left\{ \begin{array}{l} 350 \\ 6 \\ 3 \end{array} \right.$

$$(?) = \frac{144 \times 6 \times 12 \times 350 \times 6 \times 3}{30 \times 7 \times 200 \times 3 \times 2} = 259.2 \text{ da., } \textit{Ans.}$$

Ex. 5. 5 bu. = 20 pk.; 3 bu. 3 pk. = 15 pk.;

$$22 \text{ da.} \times \frac{9}{6} \times \frac{20}{15} = 44 \text{ da., } \textit{Ans.}$$

Ex. 6.  $\left\{ \begin{array}{l} (?) \\ 10\frac{2}{3} \\ 1\frac{1}{2} \end{array} \right. : \left\{ \begin{array}{l} 3000 \\ 12\frac{2}{3} \\ 2\frac{3}{4} \end{array} \right. = 1 : 1$

(?)	3000
32	3
3	38
3	2
4	11

$$(?) = 6531\frac{1}{4}, \textit{ Ans.}$$

Ex. 7.  $\left\{ \begin{array}{l} 300 \\ 1.25 \end{array} \right. : \left\{ \begin{array}{l} (?) \\ .90 \end{array} \right. = 1 : 3$

(?)	300
.90	1.25
1	3

$$(?) = 1250 \text{ bu., } \textit{Ans.}$$

Ex. 8.  $468 : (?) = \left\{ \begin{array}{l} 26 \\ 4 \end{array} \right. : \left\{ \begin{array}{l} 120 \\ 6 \end{array} \right.$

$$(?) = \frac{468 \times 120 \times 6}{26 \times 4} = 3240, \textit{ Ans.}$$

Ex. 9.  $\left\{ \begin{array}{l} 17\frac{1}{2} \\ 10\frac{1}{2} \\ 13 \end{array} \right. : \left\{ \begin{array}{l} 16 \\ 7 \\ 15 \end{array} \right. = 546 : (?)$

$$(?) = \frac{16}{1} \times \frac{7}{1} \times \frac{15}{1} \times \frac{546}{1} \text{ bbl.}$$

$$\times \frac{2}{35} \times \frac{2}{21} \times \frac{1}{13} = 384 \text{ bbl., } \textit{Ans.}$$

Ex. 10.  $7 \text{ da.} \times \frac{1}{5} \times \frac{150}{147} \times \frac{14}{10} = 22 \text{ da., } \textit{Ans.}$

## PROMISCUOUS EXAMPLES IN PROPORTION.

(Page 257.)

$$\begin{aligned} \text{Ex. 1. } 7 \text{ ft.} : 198 \text{ ft.} &= 4 \text{ ft.} : (?) \\ & 4 \text{ ft.} \times 198 \\ (?) &= \frac{\quad}{7} = 113\frac{1}{7} \text{ ft., } \textit{Ans.} \end{aligned}$$

$$\begin{aligned} \text{Ex. 2. } \$972 : \$11\frac{1}{3} &= \$607\frac{1}{2} : (?) \\ (?) &= \frac{3}{4} \times \frac{1215}{2} \times \frac{1}{972} = \$7.08 +, \textit{Ans.} \end{aligned}$$

$$\text{Ex. 3. } 3 \text{ cwt.} \times \frac{660}{80} \times \frac{12}{4} = 99 \text{ cwt., } \textit{Ans.}$$

$$\text{Ex. 4. } 18 \text{ da.} \times \frac{8}{10} = 14\frac{2}{5} \text{ da., } \textit{Ans.}$$

$$\begin{aligned} \text{Ex. 5. } \left\{ \begin{array}{l} (?) \\ 16.50 \end{array} \right. &: \left\{ \begin{array}{l} 140 \\ 24.75 \end{array} \right. = 1 : 1 \\ (?) &= \frac{140 \text{ A.} \times 24.75}{16.50} = 210 \text{ A., } \textit{Ans.} \end{aligned}$$

$$\begin{aligned} \text{Ex. 6. } \left\{ \begin{array}{l} 1728 \\ 18 \end{array} \right. &: \left\{ \begin{array}{l} 750 \\ 54 \end{array} \right. = \$155.52 : (?) \\ (?) &= \frac{\$155.52 \times 750 \times 54}{1728 \times 18} = \$202.50, \textit{Ans.} \end{aligned}$$

$$\begin{aligned} \text{Ex. 7. } 28 \text{ oz.} : (?) &= \left\{ \begin{array}{l} 2\frac{1}{2} \\ 6 \end{array} \right. : \left\{ \begin{array}{l} 150 \\ 4 \end{array} \right. \\ (?) &= 28 \text{ oz.} \times \frac{150}{1} \times \frac{4}{1} \times \frac{2}{5} \times \frac{1}{6} = 1120 \text{ oz.} = 70 \text{ lb., } \textit{Ans.} \end{aligned}$$

$$\text{Ex. 8. } 15 \text{ men} \times \frac{20}{5} = 60 \text{ men, } \textit{Ans.}$$

$$\begin{aligned} \text{Ex. 9. } 12\text{s. } 7\text{d.} &= 151\text{d.}; 1 \text{ oz.} = 240 \text{ gr.}; \\ 15 \text{ lb. } 11 \text{ oz. } 13 \text{ pwt. } 17 \text{ gr.} &= 92009 \text{ gr.}; \\ 240 \text{ gr.} : 92009 \text{ gr.} &= 151\text{d.} : (?) \\ (?) &= \frac{151\text{d.} \times 92009}{240} = 28944.497 + \text{d.}; \end{aligned}$$

$$28944.497\text{d.} \div 96 = \$301.50 +, \textit{Ans.}$$

(257)

Ex. 10.  $\left\{ \begin{array}{l} 16 \\ 7 \\ 15 \end{array} \right. : \left\{ \begin{array}{l} 17\frac{1}{2} \\ 10\frac{1}{2} \\ 16 \end{array} \right. = \$36.72 : (?)$

(?)	\$36.72
16	17.5
7	10.5
15	16

---

$$(?) = \$64.26, \text{ Ans.}$$

Ex. 11. 2 yr. 5 mo. 5 da. =  $29\frac{1}{6}$  mo.; 1 yr. 8 mo. = 20 mo.;  
and since the money lent should vary inversely as  
the time, we have  $29\frac{1}{6}$  mo. : 20 mo. = (?) : \$1200;  

$$(?) = \frac{\$1200 \times 29\frac{1}{6}}{20} = \$1750, \text{ Ans.}$$

Ex. 12. \$9 : \$5 = \$10.50 :  $\$5.83\frac{1}{3}$ , Ans.

Ex. 13.  $\left\{ \begin{array}{l} 12 \\ 9 \\ 15\frac{5}{9} \end{array} \right. : \left\{ \begin{array}{l} (?) \\ 7 \\ 15 \end{array} \right. = 2 : 1$

(?)	12
7	9
15	
2	
9	140

---

$$12 - 8 = 4 \text{ men, Ans.}$$

$$(?) = 8 \text{ men.}$$

Ex. 14. 1 yr. 8 mo. = 20 mo.; 3 yr. 4 mo. 24 da. = 40.8 mo.;  
 $\left\{ \begin{array}{l} 300 \\ 20 \end{array} \right. : \left\{ \begin{array}{l} 210.25 \\ 40.8 \end{array} \right. = \$30 : (?)$   

$$(?) = \frac{\$30 \times 210.25 \times 40.8}{300 \times 20} = \$42.891, \text{ Ans.}$$

Ex. 15.  $\left\{ \begin{array}{l} (?) \\ \frac{3}{4} \end{array} \right. : \left\{ \begin{array}{l} 9\frac{1}{2} \\ 1\frac{1}{4} \end{array} \right. = 1 : 1$

(?)	4
3	19 yd.
2	5
4	

---

Or,

$$\frac{3}{4} : 1\frac{1}{4} = 9\frac{1}{2} \text{ yd.} : (?)$$

$$(?) = \frac{1}{2} \text{ yd.} \times \frac{5}{4} \times \frac{4}{3} = 15\frac{5}{6} \text{ yd, Ans. } ( ) = 15\frac{5}{6} \text{ rd., Ans.}$$

Ex. 16.  $\left\{ \begin{array}{l} 24 \\ 18 \end{array} \right. : \left\{ \begin{array}{l} 38 \\ 22 \end{array} \right. = \$95.60 : (?)$

$$(?) = \$95.60 \times \frac{3}{2} \times \frac{2}{18} = \$185.00 +, \text{ Ans.}$$



Ex. 17.  $16\frac{7}{18}$  Cd. : (?) =  $11\frac{9}{26}$  T. :  $15\frac{7}{13}$  T.  
 (?) =  $\frac{295}{18}$  Cd.  $\times \frac{202}{13} \times \frac{26}{295} = 22\frac{4}{9}$  Cd., *Ans.*

Ex. 18.  $\begin{cases} 8 \\ 4\frac{1}{5} \\ 2\frac{1}{2} \end{cases} : \begin{cases} 18 \\ 3\frac{5}{6} \\ (?) \end{cases} = 75 : 450$   
 (?) =  $\frac{5}{2}$  ft.  $\times \frac{21}{5} \times \frac{8}{1} \times \frac{450}{1} \times \frac{6}{23}$   
 $\times \frac{1}{18} \times \frac{1}{75} = 7\frac{7}{23}$  ft., *Ans.*

Ex. 19.  $\begin{cases} 4 \\ 2\frac{1}{2} \\ 8\frac{1}{4} \end{cases} : \begin{cases} 15 \\ 3\frac{3}{4} \\ 9 \end{cases} = 6\frac{2}{3} \text{ A.} : (?)$   
 (?) =  $\frac{20}{3}$  A.  $\frac{15}{1} \times \frac{15}{4} \times \frac{9}{1} \times \frac{1}{4} \times \frac{2}{5} \times \frac{4}{33} = 40\frac{10}{11}$  A., *Ans.*

Ex. 20.  $600 \times \frac{5}{10} \times \frac{1}{2} = 450$  men, *Ans.*

Ex. 21. 120 gal.—80 gal.=40 gal. gained in 1 hour;  
 20 bar.=630 gal. to be filled;  
 40 gal. : 630 gal.=1 h. :  $15\frac{3}{4}$  h., *Ans.*

Ex. 22. 16 oz.— $14\frac{9}{16}$  oz.= $1\frac{7}{16}$  oz.= $\frac{23}{8}$  oz. Now, if every  
 16 ounces of groceries have been lessened  $\frac{23}{16}$  ounces,  
 how much should the price, \$38.40, be lessened?  
 16 oz. :  $1\frac{7}{16}$  oz. = \$38.40 : \$3.45, *Ans.*

*Another Solution.*

If every 16 oz. be reduced to  $14\frac{9}{16}$ , to what sum should  
 the cost, \$38.40, be reduced?

16 oz. :  $14\frac{9}{16}$  = \$38.40 : \$34.95  
 \$38.40—\$34.95=\$3.45, *Ans.*

Ex. 23. 75 lb. coffee  $\times \frac{8}{5} = 120$  lb. sugar;  
 5 lb. : 120 lb. = \$.625 : \$15, *Ans.*

Ex. 24.  $\$28.75 \times \frac{40}{3250} = \$35.38 +$ , *Ans.*

Ex. 25.  $\begin{cases} 12000 \\ 8 \\ 550 \end{cases} : \begin{cases} 3000 \\ 12 \\ 320 \end{cases} = 859\frac{3}{8} : (?)$   
 (?) =  $\frac{6875}{8} \times \frac{3000}{12000} \times \frac{8}{12} \times \frac{320}{550} = 83\frac{1}{3}$ , *Ans.*

Ex. 26.  $\begin{Bmatrix} 248 \\ 5\frac{1}{2} \\ 12 \end{Bmatrix} \begin{Bmatrix} 24 \\ (?) \\ 9 \end{Bmatrix} = \begin{Bmatrix} 7 \\ 232\frac{1}{2} \\ 3\frac{2}{3} \\ 2\frac{1}{3} \end{Bmatrix} : \begin{Bmatrix} 4 \\ 387\frac{1}{2} \\ 5\frac{1}{4} \\ 3\frac{1}{2} \end{Bmatrix}$

$(?) = \frac{248}{1} \times \frac{1}{2} \cdot \text{da.} \times \frac{12}{1} \times \frac{4}{1} \times \frac{775}{2} \times \frac{21}{4} \times \frac{7}{2} \times \frac{1}{24} \times \frac{1}{9}$   
 $\times \frac{1}{7} \times \frac{2}{465} \times \frac{3}{11} \times \frac{3}{7} = 155, \text{ Ans.}$

---

## PERCENTAGE.

## NOTATION.

(442, page 260.)

Ex 1. .03 ; .09 ; .12 ; .16 ; .23 ; .37 ; .75 ; 1.25 ;  
1.84 ; 2.05.

Ex. 2. .15 ; .11 ; .045 ; .0525 ; .0875 ; .205 ; .25625 ;  
.356 ; .24875 ; 1.305.

Ex. 3. .0025 ; .0075 ; .005 ; .004 ; .00375 ; .0028 ;  
.00288 ; .013125 ; .102.

Ex. 4.  $\frac{1}{25}$  ;  $\frac{3}{8}$  ;  $\frac{21}{125}$  ;  $\frac{1}{9}$  ;  $\frac{3}{7}$  ;  $\frac{5}{11}$  ;  $\frac{16}{37}$ , Ans.

Ex. 6.  $.065 = .06\frac{1}{2} = 6\frac{1}{2}$  per cent., Ans.

Ex. 7.  $.14375 = .14\frac{3}{8} = 14\frac{3}{8}$  per cent., Ans.

Ex. 8.  $.0975 = .09\frac{3}{4} = 9\frac{3}{4}$  per cent., Ans.

Ex. 9.  $.014 = .01\frac{2}{5} = 1\frac{2}{5}$  per cent., Ans.

Ex. 10.  $.1025 = .10\frac{1}{4} = 10\frac{1}{4}$  per cent., Ans.

Ex. 11.  $.004 = .00\frac{2}{5} = \frac{2}{5}$  per cent., Ans.

Ex. 12.  $.028 = .02\frac{4}{5} = 2\frac{4}{5}$  per cent., Ans.

Ex. 13.  $.1324 = .13\frac{6}{25} = 13\frac{6}{25} \%$ , Ans.

Ex. 14.  $.084\frac{2}{7} = .08\frac{3}{7} = 8\frac{3}{7} \%$ , Ans.

Ex. 15.  $.004\frac{6}{11} = .00\frac{5}{11} = \frac{5}{11} \%$ , Ans.

Ex. 16.  $.003\frac{1}{3} = .00\frac{4}{3} = \frac{4}{3} \%$ , Ans.

## GENERAL PROBLEMS IN PERCENTAGE.

(449, page 261.)

- Ex. 5. *Ans.* 70.65 lb.      Ex. 6. *Ans.* 240 mi.  
 Ex. 8. *Ans.* 919 men.      Ex. 9.  $756 \times 1.25 = 945$ , *Ans.*  
 Ex. 12.  $\frac{5}{8} \times \frac{3}{400} = \frac{1}{160}$ , *Ans.*  
 Ex. 13.  $14\frac{2}{7} \% = \frac{1}{7}$ ;  $\frac{2}{4} \times \frac{1}{7} = \frac{3}{4}$ , *Ans.*  
 Ex. 14.  $\$375 \times .05 = \$18.75$ , *Ans.*  
 Ex. 15.  $\$536 + \$450 + \$784 = \$1770$ , debts;  
 $\$1770 \times .54 = \$955.80$ , *Ans.*  
 Ex. 16.  $15 \% + 5 \% + 6 \% + 8 \% = 34 \% = .34$ ;  
 $\$1500 \times .34 = \$510$ , *Ans.*  
 Ex. 17.  $\$3500 \times 3 = \$10500$ , received in 3 years;  
 $10 \% + 12 \% + 18 \% = 40 \%$ ;  $\$3500 \times .40 = \$1400$ ,  
 spent in 3 years;  $\$10500 - \$1400 = \$9100$ , *Ans.*  
 Ex. 18.  $1.00 - .25 = .75$ ;  $.75 \times .30 = .225$ ;  
 $.25 + .225 = .475$  drawn;  
 $.475 \times .10 = .0475$  deposited again;  


---

 $1.00 - .4275 = .5725$  in bank;  
 $\$6000 \times .5725 = \$3435$ , *Ans.*  
 Ex. 19.  $2 \% + 3\frac{1}{4} \% + 2 \% + 2\frac{1}{2} \% + 1\frac{1}{2} \% + 2\frac{3}{4} \% + 4 \%$   
 $+ 3 \% = 21 \%$  entire gain;  
 $\frac{1}{2} \% + 1\frac{3}{4} \% + 1 \% + \frac{3}{4} \% = 4 \%$  " loss;  


---

 $17 \%$  net profits;  
 $\$5400 \times .17 = \$918$ , *Ans.*

(450, page 263.)

- Ex. 1.  $\$21.60 \div \$720 = .03 = 3 \%$ , *Ans.*  
 Ex. 2.  $234 \div 1560 = .15 = 15 \%$ , *Ans.*  
 Ex. 3.  $49 \div 980 = .05 = 5 \%$ , *Ans.*

(261—263)

Ex. 4. £320 10 s.=£320.5; £25 12.8 s.=£25.64;  
 $25.64 \div 320.5 = .08 = 8\%$ , *Ans.*

Ex. 5. 5 gal. 3 qt.=5.75 gal.;  
 $5.75 \div 46 = .125 = 12\frac{1}{2}\%$ , *Ans.*

Ex. 6.  $5.495 \div 7.85 = .7 = 70\%$ , *Ans.*

Ex. 7.  $\frac{2}{5} \div \frac{8}{15} = \frac{3}{4} = .75 = 75\%$ , *Ans.*

Ex. 8.  $\frac{3}{25} \div \frac{4}{7} = \frac{21}{100} = .21 = 21\%$ , *Ans.*

Ex. 9.  $80 \div 560 = \frac{1}{7} = 14\frac{2}{7}\%$ , *Ans.*

Ex. 10.  $26.01 \div 578 = .045 = 4\frac{1}{2}\%$ , *Ans.*

Ex. 11.  $\$145.836 \div \$972.24 = 15\%$ , *Ans.*

Ex. 12.  $448 \div 5600 = 8\%$ , *Ans.*

Ex. 13.  $4914 \div 7560 = 65\%$ , *Ans.*

Ex. 14.  $455 \div 2600 = 17\frac{1}{2}\%$ , *Ans.*

Ex. 15. 720 bar.—288 bar.=432 bar. unsold;  
 $432 \div 720 = 60\%$ , *Ans.*

Ex. 16.  $\frac{4}{5} \times \frac{30}{100} = \frac{6}{25}$ ;  $\frac{6}{25} \div 1 = \frac{6}{25} = \frac{24}{100} = 24\%$ , *Ans.*

Ex. 17. \$23,243,822.38

14,712,610.21

---

\$37,956,432.59  $\div$  \$83,751,511.57

$= .4532 + = 45\frac{1}{3}\%$  nearly, *Ans.*

Ex. 18.  $165 \times 5 = 825$ , aggregate number of questions asked;  
 $130 + 125 + 96 + 110 + 160 = 621$ , number answered;  
 $621 \div 825 = .7527 = 75.27\%$ , *Ans.*

(451, page 264.)

Ex. 1.  $18 \div .25 = 72$ , *Ans.*

Ex. 2.  $54 \div .15 = 360$ , *Ans.*

Ex. 3.  $17.5 \div .02\frac{1}{3} = 750$ , *Ans.*

Ex. 4.  $2.28 \div .05 = 45.6$ , *Ans.*

Ex. 5.  $414 \div 1.20 = 345$ , *Ans.*

Ex. 6.  $6119 \div 1.055 = 5800$ , *Ans.*

Ex. 7.  $.43 \div .71\frac{2}{3} = .6$ , *Ans.*

Ex. 8.  $\$18.75 \div .025 = \$750$ , *Ans.*

Ex. 9.  $31\frac{1}{4} \div .31\frac{1}{4} = 100$ , *Ans.*

Ex. 10.  $\$4578 \div .84 = \$5450$ , *Ans.*

Ex. 11.  $1.00 - .30 = .70$  %, sold;  $3150 \div .70 = 4500$ , *Ans.*

Ex. 12.  $.40 \times .13\frac{1}{3} = .05\frac{1}{3}$  for the carriage;  
 $\$116 \div .05\frac{1}{3} = \$2175$ , *Ans.*

Ex. 13.  $\$147.56 \div .13\frac{1}{3} = \$1106.70$ , A's;  
 $\$1106.70 \times .04\frac{2}{3} = \$51.646$ ;  
 $\$51.646 \div .08 = \$645.575$ , B's;  
 $\$1106.70 - \$645.575 = \$461.125$ , *Ans.*

Ex. 14.  $100$  % —  $4$  % =  $96$  %, left after the battle;  
 $.96 \times .05 = .048 = 4\frac{4}{5}$  %, died of wounds;  
 $4\frac{4}{5}$  % —  $4$  % =  $\frac{4}{5}$  % =  $.008$ , difference;  
 $168 \div .008 = 21000$ , *Ans.*

Ex. 15. A has  $\frac{3}{4}$  and B  $\frac{1}{4}$  of the prize;  
 $1.00 - .40 = .60$ ;  $\frac{3}{4} \times \frac{60}{100} = .45$  of prize, A's remainder;  
 $1.00 - .20 = .80$ ;  $\frac{1}{4} \times \frac{80}{100} = .20$  " B's "  
 $.45 - .20 = .25$ ;  $\$1950 \div .25 = \$7800$ , *Ans.*

(452, page 265.)

Ex. 1.  $1.00 + .15 = 1.15$ ;  $644 \div 1.15 = 560$ , *Ans.*

Ex. 2.  $1.00 + .04 = 1.04$ ;  $\$815.36 \div 1.04 = \$784$ , *Ans.*

Ex. 3.  $1.00 + .12 = 1.12$ ;  $\$3800 \div 1.12 = \$3392.86$ —, *Ans.*

Ex. 4.  $1.00 + .10 = 1.10$ ;  $39600 \div 1.10 = 36000$ , *Ans.*

Ex. 5.  $1.00 + 1.08 = 2.08 = 208$  % of last year's crop, raised  
in the two years; hence,  
 $5200 \text{ bu.} \div 2.08 = 2500 \text{ bu.}$ , *Ans.*

Ex. 6.  $1.00 + 1.05 = 2.05$ ;  
 $\$6970 \div 2.05 = \$3400$ , 1st year's crop;  
 $\$3400 \times 1.05 = \$3570$ , 2d " "

(264—266)



- Ex. 7. If the number be increased 8 %, the amount will be 108 % of the number; and if this amount be increased 7 %, the whole amount will be 107 % of 108 %, or  $1.08 \times 1.07 = 1.1556$  times the number; hence  $86.67 \div 1.1556 = 75$ , *Ans.*
- Ex. 8. Since he gained  $1\frac{1}{2}$  % in measure and 5 % in price, he sold 1.015 times the number of bushels bought, at 1.05 times the buying price; hence he received  $1.015 \times 1.05 = 1.06575$  times the cost; and  $\$4910.976 \div 1.06575 = \$4608$ , *Ans.*
- Ex. 9.  $1.00 = A$ 's proportion;  
 $1.06 = B$ 's        "  
 $1.04 = C$ 's        "  


---

 $3.10 =$  all their money;  
 $\$11160 \div 3.10 = \$3600$ , *Ans.*
- Ex. 10. The material cost 200 % of the labor; the cost of labor increased 9 %, would be 109 % of the labor; the cost of material increased 6 %, would be 212 % of the labor; hence the cost of the house, thus increased, would be  $109 \% + 212 \% = 321 \%$  of the cost of labor; and  $\$1284 \div 3.21 = \$400$ , cost of labor;  
 $\$400 \times 2 = \$800$  " material;  


---

 $\$1200$ , *Ans.*

(453, page 267.)

- Ex. 1.  $1.00 - .10 = .90$ ;  $504 \div .90 = 560$ , *Ans.*
- Ex. 2.  $1.00 - .08 = .92$ ;  $\$4.37 \div .92 = \$4.75$ , *Ans.*
- Ex. 3.  $1.00 - .15 = .85$ ; 40 bu.  $3\frac{1}{5}$  pk. = 40.8 bu.;  
 $40.8 \text{ bu.} \div .85 = 48 \text{ bu.}$ , *Ans.*
- Ex. 4.  $1.00 - .36 = .64$ ;  $224 \text{ A.} \div .64 = 350 \text{ A.}$ , *Ans.*

(266, 267)

Ex. 5.  $1.00 - .65 = .35$ ;  $\$2590 \div .35 = \$7400$ , *Ans.*

Ex. 6. Having drawn out 20 % of his deposit, he had  
 $100\% - 20\% = 80\%$  of his deposit, in bank; and  
 80 % of his deposit is 80 % of 80 % of his fortune;  
 $.80 \times .80 = .64$ ;  $\$5760 \div .64 = \$9000$ , *Ans.*

Ex. 7.  $100\% - 12\% = 88\%$  of his share sold to B; and  
 $\frac{7}{8} \times \frac{88}{100} = .77$  of the ship sold to B;  
 $\$20020 \div .77 = \$26000$ , *Ans.*

Ex. 8.  $1.00 - .10 = .90$ , left after the first battle;  
 $.90 \times .10 = .09$ ;  $.90 - .09 = .81$ , left after 2d battle;  
 $6480 \div .81 = 8000$  men, *Ans.*

Ex. 9. B's asking price was  $1.00 + .50 = 1.50 = 150\%$  of A's;  
 $1.00 - .20 = .80$ ; that is, A's reduced price was 80 %  
 of his asking price;  $1.50 \times .30 = .45$ ;  $1.50 - .45$   
 $= 1.05$ ; that is, B's reduced price was 105 % of  
 A's asking price; hence the sum of the reduced  
 prices was  $80\% + 105\% = 185\%$  of A's asking  
 price; and  $\$148 \div 1.85 = \$80$ , A's asking price;

$$\$80 \times 1.50 = \$120, \text{ B's " "}$$

NOTE.—In this solution A's asking price is the *base* to which all the rates are referred.

Ex. 10. Of the whole sum expended,  $\frac{1}{3}$  was for wheat,  $\frac{1}{3}$  for corn, and  $\frac{1}{3}$  for oats; hence we have

6 % of  $\frac{1}{3} = 2\%$ , cleared on wheat;

3 % of  $\frac{1}{3} = 1\%$ , " " corn;

17 % of  $\frac{1}{3} = 5\frac{2}{3}\%$ , lost " oats;

$2\frac{2}{3}\%$ , net loss;

$1.00 - .02\frac{2}{3} = .97\frac{1}{3}$ , saved;

$\$2336 \div .97\frac{1}{3} = \$2400$ , whole sum expended;

$\$2400 \div 3 = \$800$ , sum expended for each kind.

## APPLICATIONS OF PERCENTAGE.

## COMMISSION.

(462, page 270.)

Ex. 4.  $\$8600 \times .02\frac{1}{4} = \$193.50$ , *Ans.*

Ex. 5.  $\$750.75 \times .03\frac{3}{4} = \$28.15+$ , *Ans.*

Ex. 6.  $\$1.40 \times 3500 = \$4900$

$\$ .74 \times 3600 = 2664$

---

$\$7564 \times .02\frac{1}{4} = \$170.19$ , *Ans.*

Ex. 7.  $\$.23\frac{1}{2} \times 2000 = \$ 470$

$.22 \times 5650 = 1243$

$.23 \times 450 = 103.50$

$.21 \times 650 = 136.50$

---

$\$1953. \times .08\frac{1}{3} = \$162.75$ , *Ans.*

Ex. 8.  $\$25372 \times .06\frac{1}{4} = \$1585.75$ , commission;

132. , storage;

---

$\$1717.75$ , entire charges;

$\$25372 - \$1717.75 = \$23654.25$ , *Ans.*

Ex. 9.  $\$25 \times 40 = \$1000$ , cost of apple trees;

$50 \times 20 = 1000$ , " " pear "

$20 \times 16 = 320$ , " " peach "

$50 \times 18 = 900$ , " " cherry "

$50 \times 5 = 250$ , " " plum "

---

$\$3470$ , amount of sale;

$\$3470 \times .30 = \$1041$ , commission;

$\$ 203.50$ , expended;

---

$\$3470 - \$1244.50 = \$2225.50$ , proceeds, *Ans.*

Ex. 10.  $\$785 \times .82 = \$643.70$ , sum collected;

$\$643.70 \times .05 = \$32.185$ , commission, *Ans.*

- Ex. 11.  $\$1.25 \times 4000 = \$5000$ , cost;  
 $\$1.50 \times 4000 = \$6000$ , receipts;  
 $\$6000 \times .03 = \$180$ , commission;  
 $\$180 + \$415 = \$595$ ;  $\$6000 - \$595 = \$5405$ , net  
 proceeds;  $\$5405 - \$5000 = \$405$ , *Ans.*
- Ex. 12.  $\$63 \div \$1260 = .05 = 5\%$ , *Ans.*
- Ex. 13.  $\$4.50 \times 264 = \$1188$ , base of commission;  
 $\$74.25 \div \$1188 = .0625 = 6\frac{1}{4}\%$ , *Ans.*
- Ex. 14.  $\$7850 - \$7732.25 = \$117.75$ , commission;  
 $\$117.75 \div \$7850 = .015 = 1\frac{1}{2}\%$ , *Ans.*
- Ex. 15.  $\$.12\frac{1}{2} \times 28000 = \$3500$ , receipts;  
 $\$35.36 + \$10.50 = \$45.86$ , charges;  
 $\$3500 - \$3252.89 = \$247.11$ , com. and charges;  
 $\$247.11 - \$45.86 = \$201.25$ , commission;  
 $\$201.25 \div \$3500 = .0575 = 5\frac{3}{4}\%$ , *Ans.*
- Ex. 16.  $\$5635 + \$115 = \$5750$ , receipts;  
 $\$115 \div \$5750 = .02 = 2\%$ , *Ans.*
- Ex. 17.  $\$22.40 \div .04 = \$560$ , *Ans.*
- Ex. 18.  $\$6.80 \div .08 = \$85$ , *Ans.*
- Ex. 19.  $\$255 \div 1.02 = \$250$  to be invested;  
 $\$250 = \$15 = 1666\frac{2}{3}$  yd., *Ans.*
- Ex. 20.  $\$7.50 \times 860 = \$6450$ , receipts;  
 $\$6450 \times .02\frac{1}{2} = \$161.25$ , commission on sale;  
 $\$6450 - \$161.25 = \$6288.75$ , net proceeds of sale;  
 $\$6288.75 \div 1.015 = \$6195.81 +$ , *Ans.*
- Ex. 21.  $\$.06 \times 24000 = \$1440$ , receipts for pork;  
 $\$1440 \times .05 = \$72$ , commission on sale of pork;  
 $\$1440 - \$72 = \$1368$ , net proceeds;  
 $\$3000 + \$1368 = \$4368$ ;  
 $\$4368 \div 1.05 = \$4160$  to be invested;

$\$1368 - \$1160 = \$208$ , commission for investing;  
 $\$72 + \$208 = \$280$ , *Ans.*

Ex. 22.  $1.00 - .06 = .94$ ;  $\$3290 \div .94 = \$3500$ , *Ans.*

Ex. 23.  $\$6290 + \$500 = \$6790$ , receipts, less the commission;  
 $1.00 - .03 = .97$ ;  $\$6790 \div .97 = \$7000$ , receipts;  
 $\$7000 \div 500 = \$14$ , *Ans.*

Ex. 24.  $\$3500 \times .04 = \$140$ , purchase commission;  
 $\$3500 + \$140 = \$3640$ , net proceeds of auction sale;  
 $1.00 - .09 = .91$ ;  $\$3640 \div .91 = \$4000$ , *Ans.*

Ex. 25. Since the purchase commission was 2 % of the price of the city lots, the net proceeds of the sale of cotton were 102 % of the cost of the city lots; and as the proceeds divided by 1 minus the rate equal the sale, we have  $102 \% \div .97 = 105\frac{15}{97} \%$ ; that is, the sale of the cotton was  $105\frac{15}{97} \%$  of the price of the city lots; now, as the difference between the receipts from the cotton and the price of the lots is the whole commission, \$265 is  $1.05\frac{15}{97} - 1.00 = 5\frac{15}{97} \%$  of the price of the lots; therefore,

$$\$265 \div .05\frac{15}{97} = \$5141, \text{ } Ans.$$

Ex. 26.  $1. - .0075 = .9925$ ;  
 $\$5000 \div .9925 = \$50377.83 +$ , *Ans.*

## STOCKS.

### STOCK-JOBGING.

(480, page 275.)

Ex. 4.  $\$1500 \times 1.12 = \$1680$ , *Ans.*

Ex. 5.  $\$1.35 - .0175 = \$1.3325$ , proceeds of \$1;  
 $\$2000 \times 1.3325 = \$2665$ , *Ans.*

(271-275)



- Ex. 6.  $\$.8075 + \$.005 = \$.8125$ , cost of \$1 of stock;  
 $\$12000 \times .8125 = \$9750$ , *Ans.*
- Ex. 7.  $1.075 + .0025 = 1.0775$ ;  
 $\$3600 \times 1.0775 = \$3879$ , *Ans.*
- Ex. 8.  $1.00 - .60\frac{7}{8} = .39\frac{1}{8} = .39125$ ;  
 $\$21910 \div .39125 = \$56000 = 560$  shares, *Ans.*
- Ex. 9.  $\$40150 - \$40000 = \$150$ , premium;  
 $\$150 \div \$40000 = \frac{150}{40000} = \frac{3}{800} = \frac{3}{8} \%$ , *Ans.*
- Ex. 10.  $\$.94875 + \$.0125 = \$.96125$ , cost of \$1;  
 $\$48447 \div .96125 = \$50400 = 504$  shares, *Ans.*
- Ex. 11.  $\$6 \times 830 = \$4980$ , receipts;  $\$4980 \times .05 = \$249$ , com-  
mission;  $\$4980 - \$249 = \$4731$ , net proceeds of sale;  
 $.82\frac{3}{4} + .00\frac{1}{4} = .83$ ;  
 $\$4731 \div .83 = \$5700 = 57$  shares, *Ans.*
- Ex. 12.  $\$500 \times 18 = \$9000$ , par value of stock;  
 $.02 + .28 = .30$ , rate of loss;  
 $\$9000 \times .30 = \$2700$ , *Ans.*
- Ex. 13.  $\$3600 \times .95 = \$3420$ , value of railroad bonds;  
 $\$2700 \times 1.03 = 2781$ , value of bank stock;  


---

 $\$ 639$ , *Ans.*
- Ex. 14.  $\frac{525 \times 104}{105} = 520$  shares, *Ans.*
- Ex. 15.  $\$1200 \times 1.05 = \$1260$ , purchase price;  
 $\$1260 - \$96 = \$1164$ , selling price;  
 $\$1164 \div \$1200 = .97 = 97 \%$ , price per share, *Ans.*
- Ex. 16.  $\$64000 \times 1.02 = \$65280$ , cost;  
 $\$65280 + \$2560 = \$67840$ , to be sold for;  
 $\$67840 \div \$64000 = 1.06 = 106 \%$ , *Ans.*

- Ex. 17.  $\$25000 \times 1.03 = \$25750$ , cost of mining stock;  
 $\$15000 \times .95 = 14250$ , " " railroad "  


---

 $\$40000$ , money invested;  
 $\$40000 \div .80 = \$50000$ , par val. of N. Y. C. stock;  
 $\$50000 \times .85 = \$42500$ , money received;  
 $\$42500 - \$40000 = \$2500$ , *Ans.*
- Ex. 18.  $\$750 \div .03 = \$25000 = 250$  shares, *Ans.*
- Ex. 19.  $105\% - 103\% = 2\%$ , gained;  
 $\$240 \div .02 = \$12000$ , *Ans.*
- Ex. 20.  $4\% + 5\frac{1}{2}\% = 9\frac{1}{2}\%$ , loss;  
 $\$760 \div .095 = \$8000 = 80$  shares, *Ans.*
- Ex. 21.  $1.06 + .0125 = 1.0725$ ;  
 $\$6864 \div 1.0725 = \$6400$ , par value of bonds bought;  
 $1.12 - .015 = 1.105$ ;  
 $\$6400 \times 1.105 = \$7072$ , stock sold for;  
 $\$7072 - \$6864 = \$208$ , *Ans.*
- Ex. 22.  $7\% - 3\% = 4\%$ , gain;  
 $\$480 \div .04 = \$12000$ , par value of stock;  
 $\$12000 \times 1.03 = \$12360$ , money invested, *Ans.*
- Ex. 23.  $.04 + .005 = .045$ ;  $1.00 - .045 = .955$ ;  
 $\$4775 \div .955 = \$5000 = 50$  shares, *Ans.*

#### INSTALLMENTS, ASSESSMENTS AND DIVIDENDS.

(487, page 277.)

- Ex. 3.  $\$5600 \times .08 = \$448$ , *Ans.*
- Ex. 4.  $\$15000 \times .06 = \$900 = 9$  shares,  
 $\$15000 = 150$  "  


---

 $159$  shares, *Ans.*

(276, 277)

Ex. 5.  $\$6500 \times .15 = \$975$ , *Ans.*

Ex. 6.  $\$600 \div .04 = \$15000$ , *Ans.*

Ex. 7.  $\$99280 - \$56400 = \$42880$ , dividend;  
 $\$42880 \div \$536000 = .08 = 8\%$ , *Ans.*

Ex. 8.  $\$56000 \times .06 = \$3360$ , dividend;  
 $\$3616 - \$3360 = \$256$ , *Ans.*

Ex. 9.  $\$450000 \times .05\frac{1}{2} = \$25000$ , interest;  
 $\$25000 + \$217621 = \$242621$ , disbursements;  
 $\$407399 - \$242621 = \$164778$ , net earnings;  
 $\$164778 - \$78 = \$164700$ , dividend;  
 $\$164700 \div \$1830000 = .09$ , rate of dividend;  
 $\$3000 \times .09 = \$270$ , *Ans.*

Ex. 10.  $\$540000$   
 $\quad 400000$

---

$\$940000$ , entire cost of the road;  
 $\quad 800000$ , capital stock available;

---

$\$140000$ , to be assessed;  
 $\$140000 \div \$800000 = .17\frac{1}{2} = 17\frac{1}{2}\%$ , *Ans.*

Ex. 11.  $\$156753.19 \div .0525 = \$2,985,775$  nearly, *Ans.*

Ex. 12.  $\$574375.25$   
 $\quad 643672.36$

---

$\$1218047.61$ , gross earnings;  
 $\quad 651113.53$

---

$.08) \$566934.08$ , net earnings;

---

$\$7086676$ , capital stock, *Ans.*

Ex. 13.  $504 \div 1.05 = 480$ , *Ans.*

Ex. 14.  $.06 \div .75 = .08$ ; hence, a 6% dividend invested at 75% is equal to an 8% dividend invested at par;  
 (277, 278)

Therefore,

$\$16200 \div 1.08 = \$15000$ , his stock before the div.;

$\$16200 - \$15000 = \$1200$ , increase of his stock;

$\$1200 \times .75 = \$900$ , value of the increase at 75 %,  
or the money received in the dividend, *Ans.*

Ex. 15.  $.05 + .05 = .10$ , annual rate of dividend;

$\$28000 \times .10 = \$2800$ , dividend;

$\$2800 + \$2950 = \$5750$ , *Ans.*

#### STOCK INVESTMENTS.

(490, page 279.)

Ex. 1.  $\$35374.80 \div 1.025 = \$34512$ , stock purchased;

$\$34512 \times .05 = \$1725.60$ , income;

$\$1725.60 - \$1000 = \$725.60$ , *Ans.*

Ex. 2.  $.95\frac{1}{2} + .00\frac{1}{2} = .96$ ;  $1.12 + .00\frac{1}{2} = 1.125$ ;

$\$48000 \div 2 = \$24000$ , invested in each kind of stock;

$\$24000 \div .96 = \$25000$ , purchased of 5 % stock;

$\$24000 \div 1.125 = \$21333.33\frac{1}{3}$ , " 6 % "

$\$25000 \times .05 = \$1250$ , income from the 5's;

$\$21333.33\frac{1}{3} \times .06 = \$1280$ , " " " 6's;

$\$1250 + \$1280 =$   
 $\$2530$ , *Ans.*

Ex. 3.  $\$90000 \times .88 = \$79200$ , market value of bonds;

$\$79200 \div .625 = \$126720$ , capital stock purchased;

$.03 + .03\frac{1}{2} = .06\frac{1}{2}$ , annual rate from capital stock;

$\$126720 \times .06\frac{1}{2} = \$8236.80$ , income of capital stock;

$\$90000 \times .7 = 6300$  " " bonds;

$\$8236.80 + 6300 =$   
 $\$1936.80$ , *Ans.*

(278—280)

Ex. 4.  $\$32300 \div .85 = \$38000$ , purchase of 6's;  
 $\$32300 \div .95 = \$34000$ , " " 7's;  
 $\$38000 \times .06 = \$2280$ , income from 6's;  
 $\$34000 \times .07 = \$2380$ , " " 7's;  


---

 $\$100$ , *Ans.*

(491, page 280.)

Ex. 1.  $\$1200 \div .08 = \$15000$ , stock required;  
 $\$15000 \times .855 = \$12825$ , investment, *Ans.*

Ex. 2.  $\$960 \div .06 = \$16000$ , stock required;  
 $\$16000 \times .84 = \$13440$ , investment, *Ans.*

Ex. 3.  $\$630 \div .06 = \$10500$ , par value of the Virginia 6's;  
 $\$630 \div .05 = \$12600$ , U. S. 5 per cents required;  
 $\$12600 \times 1.03 = \$12978$ , cost of U. S. 5's;  
 $\$10500 \times .85 = 8925$ , price of Virginia 6's;  


---

 $\$4053$ , *Ans.*

Ex. 4.  $\$840 \div .07 = \$12000$ , California 7's required;  
 $\$12000 \times .96 = \$11520$ , cost of Cal. 7's;  
 $\$11520 \div .60 = \$19200 = 192$  shares, *Ans.*

Ex. 5. Suppose \$1.00 to be invested in each kind of stock;  
then we should have  
 $\$1.00 \div 1.04 = \$\frac{100}{104}$ , U. S. 5 per cents purchased;  
 $\$1.00 \div .95 = \$\frac{100}{95}$ , Md. " " "  
 $\$ \frac{100}{104} + \$ \frac{100}{95} = \$ \frac{1990}{988}$ , entire stock purchased;  
 $\$ \frac{1990}{988} \times \frac{5}{100} = \$ \frac{995}{988}$ , income by investing \$1 in each  
kind of stock; hence  $\$2487.50 \div \frac{995}{988} = \$24700$ , *Ans.*

(492, page 281.)

Ex. 1.  $.06 \div 1.08 = .05\frac{5}{9} = 5\frac{5}{9} \%$ , *Ans.*

Ex. 2.  $.06 \div .84 = .07\frac{1}{7} = 7\frac{1}{7} \%$ , *Ans.*

(280, 281)



- Ex. 3.  $1.34\frac{1}{2} + .01\frac{1}{2} = 1.36$ ;  
 $.085 \div 1.36 = .0625 = 6\frac{1}{4} \%$ , *Ans.*
- Ex. 4.  $.05 \div .70 = .07\frac{1}{7}$ , rate on investment in 5's;  
 $.06 \div .80 = .07\frac{1}{2}$ , " " " 6's, better.
- Ex. 5.  $.08 \div .12 = .06\frac{2}{3}$ ,  
 $.05 \div .75 = .06\frac{2}{3}$ , } rates on investments equal.
- Ex. 6.  $\$1722996 \div \$24182400 = .07\frac{1}{8}$ , rate of dividend;  
 $.07\frac{1}{8} \div .79\frac{4}{5} = .08\frac{13}{14} = 8\frac{1}{4} \%$ , *Ans.*

(493, page 282.)

- Ex. 1.  $.05 \div .08 = 62\frac{1}{2} \%$ , *Ans.*
- Ex. 2.  $.06 \div .0625 = 96 \%$ , purchase price;  
 $100\% - 96\% = 4 \%$ , *Ans.*
- Ex. 3.  $.07 \div .06 = 1.16\frac{2}{3}$ , market price;  
 $1.16\frac{2}{3} - 1 = .16\frac{2}{3} = 16\frac{2}{3} \%$ , *Ans.*
- Ex. 4.  $.06 \div .08\frac{1}{3} = 72 \%$ , *Ans.*

## PROFIT AND LOSS.

(495, page 284.)

- Ex. 4.  $\$7650 \times .20 = \$1530$ , advance;  
 $\$1530 - \$480 = \$1050$ , *Ans.*
- Ex. 5.  $\$.15 \times 320 = \$48$ , cost;  $\$48 \times .025 = \$1.20$ , *Ans.*
- Ex. 6.  $\$3.50 \times 30 = \$105$ , purchase price;  
 $\$105 \times .90 = \$94.50$ , selling " "  
 $\$94.50 \times .05 = \$4.72\frac{1}{2}$ , commission;  
 $\$105 + \$4.72\frac{1}{2} + \$5.38 = \$115.10\frac{1}{2}$ , whole outlay;  
 $\$115.10\frac{1}{2} - \$94.50 = \$20.60\frac{1}{2}$ , *Ans.*
- Ex. 7.  $1 + .33\frac{1}{3} = 1.33\frac{1}{3} = 1\frac{1}{3}$ ;  $\$.50 \times 1\frac{1}{3} = \$.66\frac{2}{3}$ , *Ans.*

(281—284)

Ex. 8.  $\$4.93 - \$4.25 = \$.68$ , gain per quintal;  
 $\$.68 \div \$4.25 = .16 = 16\%$ , *Ans.*

Ex. 9.  $\$59 \times .20 = \$11.80$ , advance of 20 %;  
 $\$59 + \$11.80 + \$4.72 = \$75.52$ , to be sold for;  
 $\$75.52 \div 944 = \$.08$ , *Ans.*

Ex. 10.  $\$157.50 \times .05 = \$7.875$ , whole loss;  
 $\$157.50 - \$7.875 = \$149.625$ , sold for;  
 $\$149.625 \div \$3.325 = 45$  gallons sold;  
 $63 \text{ gal.} - 45 \text{ gal.} = 18 \text{ gal.}$ , *Ans.*

Ex. 11. 106 A. 3 R. 30 P. = 106.9375 A.;  
 $\$96 \times 106.9375 = \$10266$ , selling price;  
 $\$10266 \div 1.18 = \$8700$ , *Ans.*

Ex. 12.  $\$21.12 \times 36.840 = \$778.0608$ , sold for;  
 $\$778.0608 \div 1.28 = \$607.86$ , cost;  
 $\$17 \times 36.840 = \$626.28$ , value at \$17 per M.,  
 $\$626.28 - \$607.86 = \$18.42$  gain, *Ans.*

Ex. 13.  $1 - .04 = .96 = 96\%$ , purchase price;  
 $1 - .28 = .72 = 72\%$ , selling “  
 $96\% - 72\% = 24\%$ , difference of prices;  
 $.24 \div .96 = .25 = 25\%$ , *Ans.*

Ex. 14.  $\$7050 \div .94 = \$7500$ , cost;  
 $\$7500 \times 1.12\frac{1}{2} = \$8437.50$ , *Ans.*

Ex. 15.  $\$182 \div .875 = \$208$ , cost of second;  
 $\$208 \div 1.30 = \$160$ , “ “ first.

Ex. 16. 15 % on  $\frac{1}{4}$  is  $\frac{1}{4}$  of 15 % =  $3\frac{3}{4}\%$  on the whole;  
 $18\frac{3}{4}\%$  on  $\frac{1}{3}$  is  $\frac{1}{3}$  of  $18\frac{3}{4}\%$  =  $6\frac{1}{4}\%$  “ “ “  
 $20\%$  on  $\frac{1}{6}$  is  $\frac{1}{6}$  of 20 % =  $3\frac{1}{3}\%$  “ “ “  
 $33\frac{1}{3}\%$  on  $\frac{1}{4}$  is  $\frac{1}{4}$  of  $33\frac{1}{3}\%$  =  $8\frac{1}{3}\%$  “ “ “

---

$21\frac{2}{3}\%$ ; rate of grain;

$\$6840 \times .21\frac{2}{3} = \$1482$ , entire gain, *Ans.*

Ex. 17. 100 % cost ;  
 $1.00 \times 1.50 = 150$  % , after 1 year ;  
 $1.50 \times 1.50 = 225$  % , “ 2 years ;  
 $2.25 \times 1.50 = 337\frac{1}{2}$  % , “ 3 “  
 $3.375 \times 1.50 = 506\frac{1}{4}$  % , “ 4 “  
 $\$12000 \div 5.0625 = \$2370.37\frac{1}{2}$  , Ans.

Ex. 18.  $\$1.80 \times 600 = \$1080$  }  
 $\$1.62\frac{1}{2} \times 1200 = \$1950$  } = \$3030  
 $\$1.25 \times 200 = 250$   


---

\$3280, cost ;  
 $\$3030 \times 1.20 = \$3636$ , receipts from first two kinds ;  
 $\$1.20 \times 200 = \$240$ , “ “ third “  


---

\$3876, total receipts ;  
 $\$3876 \times .05 = \$193.80$ , commission ;  
 $\$3876 - (\$193.80 + \$254.60) = \$3427.60$ , proceeds ;  
 $\$3427.60 - \$3280 = \$147.60$ , gain ;  
 $\$147.60 \div \$3280 = 4\frac{1}{2}$  % , Ans.

Ex. 19.  $100\% - 20\% = 80\%$ , buying price ;  
 $100\% - 16\% = 84\%$ , selling “  


---

 $4\% \div 80\% = 5\%$  , Ans.

Ex. 20. Suppose he sells 1 share of \$100 ; then  $\$100 \times .05$   
 $= \$5.00$ , annual income parted with ;  
 $\$78 \div 1.04 = \$75$ , stock purchased ;  
 $\$75 \times .06 = \$4.50$  ; annual income in return ;  
 $\$5.00 - \$4.50 = \$50$  “ “ lost ;  
 $\$.50 \div \$5.00 = .10 = 10\%$  , Ans.

Ex. 21.  $\$125 \times 12 = \$1500$ , received for each half ;  
 $\$1500 \div 1.25 = \$1200$ , cost of one half ;  
 $\$1500 \div .75 = \$2000$ , “ “ the other half ;

$$\begin{aligned} \$1200 + \$2000 &= \$3200, \text{ cost of the whole;} \\ \$1500 \times 2 &= 3000, \text{ received for the whole;} \\ &\underline{\hspace{1.5cm}} \\ &\$ 200 \text{ lost, } \textit{Ans.} \end{aligned}$$

Ex. 22.  $\$30 \times 1.20 = \$36$ , selling price;  
 $\$36 \div .75 = \$48$ , asking price, *Ans.*

Ex. 23. He asked 120 % of the cost, and sold at  $1.00 - .20 = 80$  % of the asking price. Hence  $120 \times .80 = .96$ ;  $1.00 - .96 = .04 = 4$  % loss, *Ans.*

Ex. 24.  $\$.05 \times 216 \times 200 = \$2160$ , cost of N. O. sugar;  
 $\$.05\frac{3}{4} \times 200 \times 560 = 6440$ , “ “ W. I. “  
 $\hspace{10cm} \$8600$ , entire cost;  
 $\$2160 \times .99 = \$2138.40$ , rec'd for N. O. sugar;  
 $\$6440 \times 1.00\frac{2}{3} = 6496$ , “ “ W. I. “  
 $\hspace{10cm} \$8634.40$ , “ “ the whole;  
 $\$8634.40 - \$8600 = \$34.40$ , gain;  
 $\$34.40 \div \$8600 = .004 = \frac{2}{5}$  % gain, *Ans.*

Ex. 25.  $\$31.50 \div .70 = \$45$ , prime cost of the whole;  
 $\$45 \div 63 = \$71\frac{2}{3}$ , purchase price per gallon, *Ans.*

Ex. 26.  $1.00 - .07\frac{2}{3} = .92\frac{2}{3} = .924$ , selling price;  
 $.924 \div 1.05 = .88$ , purchase price;  
 $1.00 - .88 = .12 = 12$  %, *Ans.*

Ex. 27.  $\$.025 \div .08 = \$.31\frac{1}{4}$ , *Ans.*

Ex. 28.  $\$.75 \div .1875 = \$4.00$ , cost;  
 $\$4.00 \times .31\frac{1}{4} = \$1.25$ , advance on cost;  
 $\$1.25 - \$.75 = \$.50$ , *Ans.*

Ex. 29. 30 % of  $\frac{2}{5} = .18$  of the whole;  
 5 % of  $\frac{2}{5} = .02$  “ “  
 $\hspace{10cm} \$720 \div .16 = \$4500$ , investment;  
 (285, 286)

30 % of  $\frac{2}{5} \div .12$ , of the whole ;

5 % of  $\frac{3}{5} = .03$ , “ “

$$\underline{\$4500 \times .09 = \$405, \text{ Ans.}}$$

Ex. 30. His asking price was 136 % of the cost, and his selling price was 100 %—16 % = 84 % of his asking price, or  $1.36 \times .84 = 1.1424 = 114\frac{24}{100}$  % of the cost. Hence the gain was  $14\frac{24}{100}$  % of the cost; and  $\$740.48 \div 1.1424 = \$5200$ , the cost;  $\$5200 \times 1.36 = \$7072$ , the asking price;  $\$5200 \times 1.1424 = \$5940.48$ , sold for, *Ans.*

Ex. 31. Since his gain on  $\frac{5}{8}$  was  $\frac{3}{8}$ , we have  $\frac{3}{8} \div \frac{5}{8} = .60 = 60$  %, the rate of gain, *Ans.*

Ex. 32.  $(\$ .375 \times 84 \times 4) + \$7.50 = \$133.50$ , whole cost;  $\$133.50 \times 1.25 = \$166.875$ , net avails required;  $\$166.875 \div .99 = \$168.56$ , to cover the collector's fee;  $\$168.56 \div .96 = \$175.58$ , whole sum to be obtained to cover bad debts and collector's fee; but 84 gal.  $\times 4 = 336$  gal. bought; 336 gal.  $\times .05 = 16.8$  gal., leakage and waste; 336 gal.—16.8 gal. = 319.2 gal. left for sale. Hence,  $\$175.58 \div 319.2 = \$.55+$ , *Ans.*

## INSURANCE.

### FIRE AND MARINE INSURANCE.

(503, page 288.)

Ex. 3.  $\$5860 \times .015 = \$87.90$ , *Ans.*

Ex. 4.  $\$860 \times .005 = \$4.30$ , *Ans.*

Ex. 5.  $\$3500 \times .01\frac{1}{4} = \$43.75$ , *Ans.*



Ex. 6.  $\$10000 \times .0225 = \$225$ , premium;  
 $\$10000 - \$225 = \$9775$ , *Ans.*

Ex. 7.  $\$6000 \times .01\frac{1}{4} = \$75$ , premium;  
 $\$6000 - (\$75 + \$5.50) = \$5919.50$  covered;  
 $\$10000 - \$5919.50 = \$4080.50$ , *Ans.*

Ex. 8.  $\$12000 \times \frac{4}{5} = \$9600$ , policy;  
 $\$9600 \times .00\frac{3}{4} = \$72$ , premium;  
 $\$9600 - \$72 = \$9528$ , covered by insurance;  
 $\$12000 - \$2000 = \$10000$ , whole loss;  
 $\$10000 - \$9528 = \$472$ , owner's loss, *Ans.*

Ex. 9.  $\$36000 \times .02\frac{1}{2} = \$900$ , premium received;  
 $\$18000 \times .03 = 540$ , " paid out;  


---

 $\$360$ , *Ans.*

Ex. 10.  $\$12 \div \$800 = .015 = 1\frac{1}{2} \%$ , *Ans.*

Ex. 11.  $\$107.25 \div .0325 = \$3300$ , policy;  
 $\$3300 \div .80 = \$4125$ , cost of wheat;  
 $\$4125 \div 500 = \$8.25$ , price per barrel, *Ans.*

Ex. 12.  $\$280 \div \$16000 = .0175 = 1\frac{3}{4} \%$ , *Ans.*

Ex. 13.  $\$20000 \times .00\frac{3}{4} = \$150$   
 $30000 \times .00\frac{1}{2} = 150$   


---

 $\$50000$        $\$300 \div \$50000 = .006 = \frac{3}{5} \%$ , *Ans.*

Ex. 14.  $\$46.75 \div .01375 = \$3400$ , policy;  
 $\$3400 \times 2 = \$6800$ , *Ans.*

Ex. 15.  $1 - .01125 = .98875$ ;  $\$7910 \div .98875 = \$8000$ , *Ans.*

Ex. 16.  $1 - .02\frac{3}{7} = .97\frac{4}{7}$ ;  $\$27320 \div .97\frac{4}{7} = \$28000$ , policy;  
 $\$28000 - \$27320 = \$680$ , *Ans.*

Ex. 17.  $\$122.50 \div .04\frac{3}{8} = \$1400$ , policy;  
 $\$1400 \div \frac{5}{8} = \$4480$ , *Ans.*

Ex. 18. On each \$1 which the house is worth, he obtains an insurance of \$.75, for which he pays during the 5 years,  $$.75 \times .015 \times 5 = $.05625$ ; hence the insurance will cover  $$.75 - $.05625 = $.69375$ ; and his loss on the \$1 will be  $$1 - $.69375 = $.30625$ ; therefore,  $\$2940 \div .30725 = \$9600$ , *Ans.*

Ex. 19.  $1.00 \div .025 = 40$  years, *Ans.*

Ex. 20.  $.025 \times \frac{3}{5} = .015$ , the per cent. of the policy paid for re-insuring; hence  $.0225 - .015 = .0075$ ; and  $\$72 \div .0075 = \$9600$ , *Ans.*

Ex. 21. The two companies together must lose  $1 - .0425 = .9575$  of the policy; and since the Manhattan Company becomes responsible for .50 of the policy, and receives  $.50 \times .03 = .015$  of the policy in premium, it must lose  $.50 - .015 = .485$  of the policy; therefore, the Commercial Insurance Company will lose  $.9575 - .485 = .4725$  of the policy; and consequently  $.485 - .4725 = .0125$  of the policy is \$1350; hence  $\$1350 \div .0125 = \$108000$ , the policy;  
 $\$108000 \div \frac{3}{4} = \$144000$ , value ship and cargo;  
 $\$108000 \times .9575 = 103410$ , covered by insurance;  


---

$\$40590$ , *Ans.*

#### LIFE INSURANCE.

(509, page 293.)

Ex. 2.  $50 - 30 + 1 = 21$ , number of payments;  
 $\$2600 \times .029928 = \$59.856$ , annual payment;  
 $\$59.856 \times 21 = \$1256.976$ , whole sum paid;  
 $\$2000 - \$1256.676 = \$743.024$ , *Ans.*

Ex. 3.  $\$3000 \times .046417 = \$139.25 +$ , *Ans.*

(289—293)

- Ex. 4.  $52-36+1=17$ , number of payments ;  
 $\$1500 \times .031971 = \$47.9565$ , annual payment ;  
 $\$47.9565 \times 17 = \$815.26$ , sum of payments ;  
 $\$1500 - \$815.26 = \$684.74$ , *Ans.*
- Ex. 5.  $72-54+1=19$ , number payments made ;  
 $65-54+1=12$ , " " ceasing at 65 ;  
 $\$3500 \times .055067 \times 19 = \$3661.95$  +, money paid ;  
 $\$3500 \times .078017 \times 12 = \$3276.71$  +  


---

 $\$385.24$ , *Ans.*
- Ex. 6.  $40-30+1=11$  No. pay'ts on policy issued at 30 ;  
 $40-24+1=17$  " " " " " " 24 ;  
 $\$1200 \times .09526 \times 11 = \$1257.432$ , policy issued at 30 ;  
 $\$1200 \times .05544 \times 17 = \$1130.975$ , " " " 24 ;  


---

 $\$126.456$ , *Ans.*
- Ex. 7.  $49-37+1=13$ , number of payments ;  
 $.07325-.04525=.028$ , difference in annual rate % ;  
 $\$750 \times .028 \times 13 = \$273$ , *Ans.*
- Ex. 8.  $\$100 \div \$1.7296 = 58$ —, A's number of payments,  
 requiring 57 years ; hence  $20+57=77$  years, A's age ;  
 $\$100 \div \$2.3023 = 44$ —, B's number of payments re-  
 quiring 43 years ; hence  $30+43=73$  years, B's age.
- Ex. 9.  $60-45+1=16$ , number of payments ;  
 $\$1000 \times .06686 \times 16 = \$1069.76$ , *Ans.*
- Ex. 10.  $\$600 \times .037142 = \$22.285$  +, 1 payment ;  
 $\$600 - \$421.72 = \$178.28$ , whole premium paid ;  
 $\$178.28 \div \$22.285 = 8$ , *Ans.*
- Ex. 11.  $40-29+1=12$ , number of payments ;  $\$.022346$   
 $\times 12 = \$.268152$ , whole premium on a policy of \$1 ;  
 $\$1 - \$.268152 = \$.731848$ , secured on each \$1 ;  
 $\$1829.62 \div .731848 = \$2500$ , *Ans.*

## TAXES.

(514, page 296.)

Ex. 2.	Tax on \$8000	is	\$32.00
	" " 500	"	2.00
	" " 30	"	.12
	" " 3 polls	"	1.50
<hr/>			
\$35.62, <i>Ans.</i>			

Ex. 3.	Tax on \$900	is	\$3.60
	" " 80	"	.32
	" " 7	"	.028
	" " 1 poll	"	.50
<hr/>			
\$4.448, <i>Ans.</i>			

Ex. 4.  $\$.25 \times 2156 = \$539$ , amount of poll tax,  
 $\$6319 - (\$654 + \$539) = \$5126$ , property tax;  
 $\$5126 \div \$1864000 = .00275$ , rate of taxation for town  
purposes;  $.00275 + .0015 + .0005 = .00475$ , full rate;  
 $\$32560 \times .00475 = \$154.66$ , A's property tax;  
 $\$.25 \times 3 = .75$ , " poll tax;  


---

\$155.41, *Ans.*

Ex. 5.  $\$16840 \times .00475 = \$79.99$ , *Ans.*

Ex. 6.  $\$5561.50 \div .98 = \$5675$ , *Ans.*

Ex. 7.  $\$9120 \div .95 = \$9600$ , tax to be raised;  
 $\$9600 \div \$1536000 = .00625 = \frac{5}{8} \%$ , *Ans.*

Ex. 8.  $\$1200 + \$57.65 + \$38.25 = \$1295.90$ , whole expense;  
 $\$1295.90 - \$257.75 = \$1038.15$ , tax by rate-bill;  
 $\$1038.15 \div 9568 = \$.108502$ , rate per day;  
 $\$.108502 \times 46 \times 4 = \$19.96$ , *Ans.*

Ex. 9.  $\$1260.52 \div .965 = \$1306.24$ , tax to be assessed;  
 $\$1306.24 \div .00325 = \$401920$ , base of taxation, or  
valuation of property, *Ans.*

## GENERAL AVERAGE.

(518, page 298.)

Ex. 1.	Losses.	Contributory Interests.
	Jettson, \$6300	Vessel, \$25000
	Repairs, less $\frac{1}{3}$ , 1000	Freight, less $\frac{1}{3}$ , 2800
	Cost of detention, 420	Cargo, 25200
	<hr/> Total, \$7720	<hr/> Total, \$53000

$$\$7720 \div \$53000 = .1456603 +, \text{ rate of loss ;}$$

$$\$25200 \times .1456603 = \$3670.64, \text{ payable by Hayden \& Co. ;}$$

$$\begin{array}{r} \$6300 \\ \hline \end{array} \text{ , receivable " "}$$

$$\begin{array}{r} \$2629.36 \\ \hline \end{array} \text{ , balance due " "}$$

Or,

$$\$27800 \times .1456603 = \$4049.36, \text{ payable by George Law ;}$$

$$\begin{array}{r} 1420 \\ \hline \end{array} \text{ , receivable " "}$$

$$\begin{array}{r} \$2629.36 \\ \hline \end{array} \text{ , balance due Hayden \& Co.}$$

Ex. 2.	Losses.	Contributory Interests.
	Jettson, \$1570	Vessel, \$28000
	Repairs, less $\frac{1}{3}$ , 180	Freight, less $\frac{1}{3}$ , 1000
	Detention, 120	Cargo, 5000
	<hr/> Total, \$1870	<hr/> Total, \$34000

$$\$1870 \div \$34000 = .055, \text{ rate of loss ;}$$

$$\$29000 \times .055 = \$1595, \text{ contributed by ship owners ;}$$

$$\$180 + \$120 = 300, \text{ due " "}$$

$$\begin{array}{r} \$1295 \\ \hline \end{array} \text{ , payable by " "}$$

$$\$750 \times .055 = \$41.25 \text{ " " C ;}$$

$$\$2400 \times .055 = \$132, \text{ contributed by A ;}$$

$$\$1400 - \$132 = \$1268, \text{ receivable " "}$$

$$\$1850 \times .055 = \$101.75, \text{ contributed by B ;}$$

$$\$170 - \$101.75 = \$68.25, \text{ receivable " "}$$



## CUSTOM HOUSE BUSINESS.

(529, page 301.)

Ex. 4.  $\$2780 \times .04 = \$111.20$ , *Ans.*

Ex. 5.  $\$.055 \times 1200 = \$66$ , cost;  $\$66 \times .15 = \$9.90$ , *Ans.*

Ex. 6.  $112 \text{ lb.} \times 54 = 6048 \text{ lb.}$ , gross weight, long ton measure;  
 $6048 \text{ lb.} \times .035 = 211.68 \text{ lb.}$ , tare;  
 $6048 \text{ lb.} - 211.68 \text{ lb.} = 5836.32 \text{ lb.}$ , net weight;  
 $\$.0875 \times 5836.32 = \$510.678$ , net value;  
 $\$510.678 \times .15 = \$76.60+$ , *Ans.*

Ex. 7.  $36 \text{ gal.} \times 50 = 1800 \text{ gal.}$ , gross measure;  
 $1800 \text{ gal.} \times .015 = 27 \text{ gal.}$ , leakage;  
 $1800 \text{ gal.} - 27 \text{ gal.} = 1773 \text{ gal.}$ , net measure;  
 $\$2.50 \times 1773 = \$4432.50$ , net value;  
 $\$4432.50 \times .30 = \$1329.75$ , duty;  
 $\$2.50 \times 1800 = 4500$  invoice;  
 $\$1.30 \times 50 = 65$  freight;  
 $8.50$ , cartage;  


---

 $\$5903.25$ , *Ans.*

Ex. 8.  $120 \text{ doz.} \times .02 = 2.4 \text{ doz.}$ , breakage;  
 $120 \text{ doz.} - 2.4 \text{ doz.} = 117.6 \text{ doz.}$ , net measure;  
 $\$1.25 \times 117.6 = \$147$ , net value;  
 $\$147 \times .24 = \$35.28$ , *Ans.*

Ex. 9.  $\$619.40 \div .19 = \$3260$ , *Ans.*

Ex. 10.  $.05\frac{1}{4} \times 14 \times 600 = \$441$ , invoice, base of duty;  
 $\$35.28 \div \$441 = .08 = 8\%$ , *Ans.*

Ex. 11.  $\$.30 \times 63 \times 200 = \$3780$   
 $\$.05 \times 500 \times 150 = 3750$   


---

 $\$7530 \times .24 = \$1807.20$   
 $\$2.50 \times 80 = \$200$

(301, 302)

$$\$3.00 \times 75 = \$225$$

$$\$425 \times .08 =$$

$$34$$

$$\$1841.20, \text{ Ans.}$$

Ex. 12.  $36 \text{ gal.} \times 56 = 2016 \text{ gal.};$

$$\$907.20 \div .30 = \$3024, \text{ cost};$$

$$\$3024 \div 2016 = \$1.50, \text{ Ans.}$$

Ex. 13.  $\$132 \div .24 = \$550$ , on which duty was reckoned;

$$\$550 \div .88 = \$625, \text{ Ans.}$$

Ex. 14.  $\$1980.50 - \$12.24 = \$1968.26$ , invoice and duty;

$$\$1968.26 - \$1654 = \$314.26, \text{ duty};$$

$$\$314.26 \div \$1654 = .19 = 19\%, \text{ Ans.}$$

Ex. 15.  $\$823.20 \div .24 = \$3430$ , net value;

$$\$3430 \div \$ .25 = 13720 = 1143\frac{1}{3} \text{ doz., Ans.}$$

## SIMPLE INTEREST.

(540, page 307.)

Ex. 3. Ans. \$.921.

Ex. 4. Ans. \$5.885+.

Ex. 6. Ans. \$178.94—.

Ex. 8. Ans. \$770.

Ex. 12. Ans. \$2.80.

Ex. 14. Ans. \$195.765+.

Ex. 15. Ans. \$12.06+.

Ex. 16. Ans. \$46.875.

Ex. 18. Ans. \$160.625.

Ex. 20. Ans. \$28.34+.

Ex. 23. Ans. \$24.18+.

Ex. 24. Ans. \$72.96.

Ex. 29. Ans. \$40.83 $\frac{1}{3}$ .

Ex. 30. Ans. \$11.69+.

Ex. 31. Ans. \$13.88+.

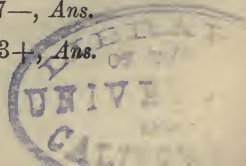
Ex. 33. Ans. \$2.43—.

Ex. 34. Ans. \$26.70+.

Ex. 39. Ans. \$5019.44 $\frac{4}{9}$ .

Ex. 41. Time, 2 yr. 7 mo. 13 da.; \$2078.87—, Ans.

Ex. 42. Time, 7 yr. 8 mo. 16 da.; \$4615.43+, Ans.



Ex. 43. Time, 2 yr. 4 mo. 15 da.; \$42.86+, *Ans.*

Ex. 44. 21 yr.—15 yr. 3 mo. 20 da.=5 yr. 8 mo. 10 da.;  
 $\$3754.45 + \text{int. for 5 yr. 8 mo. 10 da.}$   
 $= \$5037.22 +$ , *Ans.*

Ex. 45. He gains the difference between the legal rates of interest in the two places, which is 1 % on \$7500; hence,  $\$7500 \times .01 = \$75$ , *Ans.*

Ex. 46. Cash, \$3200  
 $\$3500 + \text{int. for 6 mo.} = 3622.50$   
 $\$2500 + \text{ " " 10 " } = 2645.83\frac{1}{3}$   
 $\$2120 + \text{ " " 15 " } = 2305.50$   


---

*Ans.*  $\$11773.83\frac{1}{3}$

Ex. 47.  $\$6840 + \text{int. from May 10, 1859, to June 21, 1860,}$   
 $= \$7297.14$ , the cost of the flour;  
 $\$6840 \div \$5.70 = 1200$  barrels purchased;  
 $\$6.625 \times 1200 = \$7950$  receipts;  
 $\$7950 - \$7297.14 = \$652.86$ , *Ans.*

Ex. 48.

As he pays 7 % per year of 360 days, and, by agreement, receives 6 % per year of 365 days,

The int. in N. Y.  $= \frac{1}{3} \frac{46}{60} = \frac{73}{180}$  of a year's int.,

And the int. in O.  $= \frac{1}{3} \frac{46}{65} = \frac{2}{5}$  of a year's int.

Hence, he pays  $\$15000 \times \frac{7}{100} \times \frac{73}{180} = \$425.83\frac{1}{3}$ ,

He receives  $\$15000 \times \frac{6}{100} \times \frac{2}{5} = \$360.00$ ,

And he loses  $\$65.83\frac{1}{3}$ . *Ans.*

Ex 49.  $\$1250 + \text{interest for 7 mo. 16 da.} = \$1304.93$   
 $\$3540.84 + \text{ " " 4 " 27 " } = 3642.049$   
 $\$ 575 + \text{ " " 3 " } = 585.062$   
 $\$816.90 + \text{ " " 1 " 7 " } = 822.777$

*Ans.*  $\$6354.818 +$

- Ex. 50.  $33 \times 11 = 363$  da., whole time for which he rec'd int.;  
 $.363 \div 6 = \$0.0605$ , interest on \$1 at 6 %;  
 $\$.0605 \times 4 = \$.242$ , " " " " 2 % a month;  
 $\$.242 - \$.06 = \$.182$ , interest gained on \$1;  
 $\$.182 \times 1000 = \$182$ , *Ans.*
- Ex. 51. He gained at the rate of  $12\frac{1}{2}\%$  —  $7\frac{3}{4}\%$  =  $4\frac{3}{4}\%$   
per annum, for 2 yr. 5 mo. 10 da. =  $2\frac{4}{9}$  yr.; hence  
 $\$21840 \times .04\frac{3}{4} \times 2\frac{4}{9} = \$2535.86\frac{2}{3}$ , *Ans.*
- Ex. 52.  $\$27.50 \times 450 = \$12375$ , money borrowed;  
 $\$12375 +$  int. for 4 yr. 11 mo. 20 da. =  $\$15759.22$ ,  
outlay;  $\$34 \times 180 = \$6120$   
 $\$32.55 \times 270 = 8788.50$  returns,  $14908.50$ ;  

*Ans.*,  $\$850.72$ .
- Ex. 53.  $\$1.12\frac{1}{2} \times 4500 = \$5062.50$ , cost;  
 $\$1.06 \times 4500 = \$4770$ , wheat sold for;  
 $\$4770 \times .05 = \$238.50$ , interest;  
 $\$4770 + \$238.50 = \$5008.50$ , total returns;  
 $\$5062.50 - \$5008.50 = \$54$ , loss, *Ans.*

## PARTIAL PAYMENTS.

(543, page 312.)

Ex. 2.

Amount of note, Oct. 15, 1860, (1 yr.),	\$1272.00
Payment,	1000.00
New principal,	\$272.00
Amount, April 15, 1861, (6 mo.),	280.16
Payment,	200.00
New principal,	\$80.16
Amount, Oct. 15, 1861, (6 mo.),	82.56+, <i>Ans.</i>

(309—312)

## Ex. 3.

Amt. of note, Mar. 4, 1856, (8 mo. 24 da.), \$888.19+  
 Payment, 210.93

New principal, \$667.26+  
 Am't, July 9, 1857, (1 yr. 4 mo. 5 da.), 732.01+  
 Payment, 140.00

New principal, \$592.01+  
 Amount, Feb. 20, 1858, (7 mo. 11 da.), 613.81+  
 Payment, 178.00

New principal, \$435.81+  
 Am't, May 5, 1859, (1 yr. 2 mo. 15 da.), 467.41+  
 Payment, 154.30

New principal, \$313.11+  
 Amount, Jan. 17, 1860, (8 mo. 12 da.), 326.26+  
 Payment, 259.45

New principal, \$66.81  
 Am't, Oct. 24, 1861, (1 yr. 9 mo. 7 da.), 73.90+, *Ans.*

## Ex. 4.

Amt. note, Oct. 20, 1861, (1 yr. 1 mo. 16 da.), \$415.34+  
 Payment, 126.50

New principal, \$288.84  
 Amount, Jan. 1, 1862, (2 mo. 11 da.), 292.83—, *Ans.*

## Ex. 5.

Amt. of note, June 1, 1857, (2 mo. 25 da.), \$3516.02+  
 Payment, 1247.60

New principal, \$2268.42+  
 Amount, Sept. 10, 1857, (3 mo. 9 da.), 2299.61+  
 Payment, 1400.00



New principal,	\$899.61+
Amount, Jan. 31, 1858, (4 mo. 21 da.),	917.23+, <i>Ans.</i>

Ex. 6.

Mortgage,	\$9750.00
Payment, Oct. 1, 1860,	846.50

Due, Jan. 1, 1861, (9 mo. from date),	\$8903.50
Amt., Oct. 20, 1862, (1 yr. 9 mo. 19 da.),	10508.60+
Payment,	2500.00

New principal,	\$8008.60+
Amount, July 3, 1863, (8 mo. 13 da.),	8571.43—
Payment,	1500.00

New principal,	\$7071.43—
Amount, Jan. 1, 1864, (5 mo. 28 da.),	7421.06+
Payment,	500.00

New principal,	\$6921.06+
Amount, Apr. 1, 1865, (1 yr. 3 mo.),	7786.19+, <i>Ans.</i>

Ex. 7.

Amount of note, May 1, 1861, (3 mo.),	\$507.50
Payment,	40.00

New principal,	\$467.50
Amount, May 1, 1862, (1 yr.),	495.55
Sum of payments, \$8+\$12+\$30=	50.00

New principal,	\$445.55
Amt., Sept. 16, 1862, (4 mo. 15 da.),	455.57+, <i>Ans.</i>

(546, page 314.)

Ex. 1.

Amount, Apr. 1, 1857, (1 yr. 2 mo.),	\$1070
1st payment,	80

New principal,	\$ 990
Amt., Apr. 1, 1858, (1 yr.),	1049.40
Amt. of 2d payment to date, (8 mo.),	31.20
	<hr/>
New principal,	\$1018.20
Amt., Dec. 1, 1858, (8 mo.),	1058.93—
Sum of 3d and 4th payments,	610.00
	<hr/>
New principal,	\$448.93—
Amt., Oct. 1, 1859, (10 mo.),	471.38—
Amt. of 5th payment, to date, (5 mo.),	205.00
	<hr/>
	\$ 266.38—, <i>Ans.</i>

Ex. 2.

Amt. of principal, Jan. 10, 1863, (4 yr. 8 mo.),	\$2560
	<hr/>
Amt. of 1st indorsement, (3 yr. 10 mo.),	\$ 984
“ “ 2d “ (2 yr. 8 mo.),	464
“ “ 3d “ (1 yr. 4 mo.),	.324
	<hr/>
	\$ 788, <i>Ans.</i>

Ex. 3.

Amount, May 10, 1859, (1 yr.),	\$2120
Am't of 1st payment from Mar. 10 to May 10, 1859, (2 mo.),	808
	<hr/>
New principal,	\$1312
Am't, May 10, 1860, (1 yr.),	1390.72
2d payment,	400.00
	<hr/>
New principal,	\$990.72
Am't, Sept. 10, 1861, (1 yr. 4 mo.),	1069.98+
3d payment,	300.00
	<hr/>
New principal,	\$769.98+
Am't, Jan. 10, 1863, (1 yr. 4 mo.),	831.58+, <i>Ans.</i>

*By the New Hampshire Rule.*

Ex. 4.

Am't of note, May 10, 1859, (1 yr.),	\$2120
Am't of 1st payment, to date, (2 mo.),	808
	<hr/>
New principal,	\$1312
Am't, May 10, 1860, (1 yr.),	1390.72
2d payment,	400
	<hr/>
New principal,	\$990.72
Am't, May 10, 1861, (1 yr.),	1050.16+
Am't, May 10, 1862, (1 yr.),	1113.17+
Am't of 3d payment, (8 mo.),	312.00
	<hr/>
New principal,	\$801.17+
Am't, Jan. 10, 1863, (8 mo.)	833.21+, <i>Ans.</i>

*By the United States Rule.*

Am't, Mar. 10, 1859, (10 mo.),	\$2100
Payment,	800
	<hr/>
New principal,	\$1300
Am't, May 10, 1860, (1 yr. 2 mo.),	1391
Payment,	400
	<hr/>
New principal,	\$991
Am't, Sept. 10, 1861, (1 yr. 4 mo.),	1070.28
Payment,	300
	<hr/>
New principal,	\$770.28
Am't, Jan. 10, 1863, (1 yr. 4 mo.),	831.90+, <i>Ans.</i>

## SAVINGS BANK ACCOUNTS.

(549, page 316.)

Ex. 2.

Sum of deposits, Jan. 20,	\$26.80
Draft, Jan. 28,	5
	<hr/>
Balance, Feb. 1,	\$21.80
Draft, Feb. 7,	8.48
	<hr/>
Least balance during current month,	\$13.32
Sum of deposits, Feb. 20 and 27,	24.85
Int. on \$13.32 for 1 mo.,	.07
	<hr/>
Balance, Mar. 1,	\$38.24
Deposit, Mar. 6,	14.65
	<hr/>
	\$52.89
Draft, Mar. 20,	10
	<hr/>
	\$42.89
Deposit, Mar. 29,	7.98
Int. on \$38.24, (least bal.) for 1 mo.,	.19
	<hr/>
Balance, Apr. 1,	\$51.06
Draft, April 11,	12.76
	<hr/>
	\$38.30
Deposit, April 25,	3.49
Int. on \$38.30 (least bal.) for 1 mo.,	.19
	<hr/>
Balance, May 1,	\$41.98
Sum of deposits during May,	72.29
Int. on \$41.98, (least bal.) for 1 mo.,	.21
	<hr/>

Balance, June 1,	\$114.48
Sum of drafts during June,	31.92

---

 \$82.56

Int. on \$82.56 (least bal.) for 1 mo.,	.41
---	-----

---

 \$82.97

Balance, July 1,	\$82.97
Deposit, July 28,	15.68

Int. on \$82.97 (least bal.) for 1 mo.,	.41
---	-----

---

 \$99.06

Balance, Aug. 1,	\$99.06
Deposit, Aug. 3,	18.45

---

 \$117.51

Draft, Aug. 17,	5.64
-----------------	------

---

 \$111.87

Deposit, Aug. 26,	4.50
-------------------	------

Int. on \$99.06 (least bal.) for 1 mo.,	.50
---	-----

Balance, Sept. 1, 1860,	\$116.87, <i>Ans.</i>
-------------------------	-----------------------

Ex. 3.

Balance, Jan. 1, 1859,	\$ 47.50
------------------------	----------

Deposit, March 12, 1859,	124.36
--------------------------	--------

Int. on \$47.50 for 3 mo.,	.83
----------------------------	-----

Balance, April 1, 1859,	\$172.69
-------------------------	----------

Draft, May 12, 1859,	50 36
----------------------	-------

---

 \$122.33

Deposit, June 20, 1859,	130.56
-------------------------	--------

Int. on \$122.33 (least bal.) for 3 mo.,	2.14
--	------

Balance, July 1, 1859,	\$255.03
------------------------	----------

Deposit, Aug. 3, 1859,	68.75
------------------------	-------

Int. on \$255.03 (least bal.) for 3 mo.,	4.46
--	------



Balance, Oct. 1, 1859,	\$328.24
Sum of drafts, Oct., Nov., and Dec., 1859,	74.76
	<hr/>
	\$253.48
Int. on \$253.48 (least bal.) for 3 mo.,	4.43
	<hr/>
Balance, Jan. 1, 1860,	\$257.91
Deposit, Jan. 25, 1860,	160.80
Int. on \$257.91 (least bal.) for 3 mo.,	4.51
	<hr/>
Balance, April 1 or 4, 1860,	\$423.22, <i>Ans.</i>
Ex. 4.	
Balance, July 1, 1858,	\$175
Draft, Sept. 14, 1858,	65
	<hr/>
	\$110
Deposit, Nov. 1, 1858,	150
Int. on \$110 (least bal.) for 6 mo.,	3.30
	<hr/>
Balance, Jan. 1, 1859,	\$263.30
Deposit, Feb. 24, 1859,	200
Int. on \$263.30 (least bal.) for 6 mo.,	7.90
	<hr/>
Balance, July 1, 1859,	\$471.20
Draft, July 25, 1859,	120
	<hr/>
	\$351.20
Deposit, Sept. 10, 1859,	56
	<hr/>
	\$407.20
Draft, Dec. 3, 1859,	80
	<hr/>
	\$327.20
Int. on \$327.20 (least bal.) for 6 mo.,	9.82
	<hr/>
	\$337.02, <i>Ans.</i>

Ex. 5.

Deposit, Jan. 1, 1858,	\$36.50
Int. on the same for 6 mo.,	.91
Deposit, Mar. 17, 1858,	25.38
Int. on the same for 3 mo.,	.32

Balance, July 1, 1858, \$63.11

Deposit, Aug. 1, 1858,	\$84.72	
Draft, Sept. 16, 1858,	36.16	
	<u>          </u>	48.56
Int. on \$63.60 for 6 mo.,		1.58
“ “ \$48.56 “ 3 “		.61

Balance, Jan. 1, 1859, \$113.86

Draft, Jan. 27, 1859,	\$13.48	
“ Mar. 1, “	17.50	
	<u>          </u>	30.98

\$82.88

Deposit, June 11, 1859,	50
Int. on \$84.26 (least bal.) for 6 mo.,	2.07

Balance, July 1, 1859, \$134.95

Deposit, Nov. 16, 1859,	40.78
Int. on \$137.21 (least bal.) for 6 mo.,	3.37

Balance, Jan. 1, 1860, \$179.10, *Ans.*

## COMPOUND INTEREST.

(550, page 318.)

<b>Ex. 1.</b>	\$750	Principal for 1st year ;
$\$750 \times 1.06 =$	795	“ “ 2d “
$\$795 \times 1.06 =$	842.70	“ “ 3d “
$\$842.70 \times 1.06 =$	893.26	“ “ 4th “
$\$893.26 \times 1.06 =$	946.86,	Amount “ 4 years ;
	750	Principal ;

---

*Ans.* \$196.86—, Compound interest.

<b>Ex. 2.</b>	\$250	Principal for 1st year ;
$\$250 \times 1.07 =$	267.50	“ “ 2d “
$\$267.50 \times 1.07 =$	286.23	“ “ 3d “
$\$286.23 \times 1.07 =$	306.26+	<i>Ans.</i>
<b>Ex. 3.</b>	\$1475.50	Principal 1st half year ;
$\$1475.50 \times 1.035 =$	\$1527.15	“ 2d “
$\$1527.15 \times 1.035 =$	1580.60	“ 3d “
$\$1580.60 \times 1.035 =$	1635.92	“ 4th “
$\$1635.92 \times 1.035 =$	1693.18	“ 5th “
$\$1693.18 \times 1.035 =$	1752.43+	<i>Ans.</i>

<b>Ex. 4.</b>	\$376	Principal for 1st year ;
$\$376 \times 1.06 =$	398.56	“ “ 2d “
$\$398.56 \times 1.06 =$	422.47	“ “ 3d “
$\$422.47 \times 1.06 =$	447.81	Prin. for 8 mo. 15 da. ;
$\$447.81 \times 1.0425 =$	466.84	Amt. 3 yr. 8 mo. 15 da. ;
	376	
	<hr/>	
	\$ 90.84+	<i>Ans.</i>

(551, page 320.)

**Ex. 2.**  $\$536.75 \times 2.51817 = \$1351.63$ —, *Ans.*

(318—320)

- Ex. 3. There will be 5 half years and 3 mo. 12 days over ;  
 $\$.019\frac{5}{6}$ , simple interest of \$1 for 3 mo. 12 da. ;  
 $\$.194\frac{5}{6}$  " " " " " 2 yr. 9 mo. 12 da. ;  
 $\$1275 \times 1.187686 = \$1514.299 +$ , amt. of the given  
sum at  $3\frac{1}{2}\%$  per half year, for 2 yr. 6 mo. ;  
 $\$1514.299 \times 1.019\frac{5}{6} = \$1544.332 +$ , amt. for 2 yr.  
9 mo. 12 da. ;  
 $\$1544.331 \div 1.194\frac{5}{6} = \$1292.51 -$ , *Ans.*
- Ex. 4. There will be 7 interest terms of 3 mo. each, and 1  
partial term of 1 mo. 20 da. ; hence,  
 $\$1840 \times (1.02)^7 \times 1.01\frac{1}{3} = \$2137.06 +$ , *Ans.*
- Ex. 5. 21 yr.—12 yr. 7 mo. 12 da. = 8 yr. 4 mo. 18 da. ;  
 $\$15000 \times 1.733986 = \$26009.79$ , amt. for 8 yr. ;  
697.93, int. for 4 mo. 18 da. ;  


---

 $\$26707.72$ , *Ans.*
- Ex. 6. Since \$1 will amount to \$3.869685, the sum which  
will amount to \$2902.263 in the same time is  
 $\$2902.263 \div 3.869685 = \$750$ , *Ans.*

## PROBLEMS IN INTEREST.

(552, page 321.)

- Ex. 1. Int. of \$1 for 1 yr. 6 mo. is \$.0975 ;  
 $\$279.825 \div .0975 = \$2870$ , *Ans.*
- Ex. 2. Int. of \$1 for 6 mo. 24 da. is \$.0425 ;  
 $\$63.75 \div .0425 = \$1500$ , *Ans.*
- Ex. 3. Int. of \$1 for 10 da. is \$.0027 $\frac{7}{9}$  =  $\$ \frac{25}{9000}$  ;  
 $\$12\frac{1}{2} \div \frac{25}{9000} = \$4500$ , *Ans.*
- Ex. 4.  $\$3125 \div .125 = \$25000$ , *Ans.*  
. (320, 321)

- Ex. 5.  $\$30 \times 12 = \$360$ , yearly income;  
 $\$360 \div .095 = \$3789.47 +$ , *Ans.*
- Ex. 6. Int. of \$1 for 6 yr. 5 mo. 11 da. is  $\$.451\frac{11}{16}$ ;  
 $\$3159.14 \div .451\frac{11}{16} = \$7000$ , *Ans.*
- Ex. 7. The compound interest of \$1 for 2 yr. 9 mo. is  
 $\$.174162$ ;  $\$69.67 \div .174162 = \$400 +$ , *Ans.*
- Ex. 8. The compound interest of \$1 for 1 yr. 6 mo. 15 da. is  
 $\$.09445$ ;  $\$124.1624 \div .09445 = \$1314.583 +$ , *Ans.*

(553, page 322.)

- Ex. 1. The amount of \$1 for 2 yr. 3 mo. 10 da. is  $\$1.113\frac{8}{9}$ ;  
 $\$1893.61\frac{1}{9} \div 1.113\frac{8}{9} = \$1700$ , *Ans.*
- Ex. 2. The amount of \$1 for 3 yr. 5 mo. 12 da. is  $\$1.207$ ;  
 $\$681.448 \div 1.207 = \$564.58 -$ , *Ans.*
- Ex. 3. The amount of \$1 for 10 yr. 2 mo. is  $\$1.35\frac{7}{12}$ ;  
 $\$15660 \div 1.35\frac{7}{12} = \$11550.09 +$ , *Ans.*
- Ex. 4. The amount of \$1 for 2 yr. 8 mo. 29 da.  
 is  $\$1.1923055 +$ ;  
 $\$1568.97 \div 1.1923055 = \$1315.913 -$ , sum at int.;  
 $\$1568.97 - \$1315.913 = \$253.057 +$ , *Ans.*
- Ex. 5. The amount of \$1 for 243 da. is  $\$1.054$ ;  
 $\$11119.70 \div 1.054 = \$10550$ , sum at interest;  
 $\$11119.70 - \$10550 = \$569.70$ , *Ans.*
- Ex. 6. The amount of \$1 at compound interest for 4 yr. is  
 $\$1.262477$ ;  $\$8644.62 \div 1.262477 = \$6847.34 +$ .
- Ex. 7. Amount of \$1 for 10 yr. 5 mo. is  $\$1.835619$ ;  
 $\$26772.96 \div 1.835619 = \$14585.24 +$ , *Ans.*

(321, 322)



(554, page 323.)

- Ex. 1. \$9.375, interest on \$750 at 1 % ;  
 $\$796.875 - \$750 = \$46.875$ , whole interest ;  
 $\$46.875 \div \$9.375 = 5$  % , *Ans.*
- Ex. 2.  $\$1.32\frac{2}{3}$ , interest on \$1700 at 1 % ;  
 $\$10.58 \div \$1.32\frac{2}{3} = 8 +$  % , *Ans.*
- Ex. 3. \$57, interest on \$600 at 1 % ;  
 $\$856.50 - \$600 = \$256.50$ , whole interest ;  
 $\$256.50 \div \$57 = 4\frac{1}{2}$  % , *Ans.*
- Ex. 4. \$72.6628, income at 1 % ;  
 $\$744.7937 \div \$72.6628 = 10\frac{1}{4}$  % , *Ans.*
- Ex. 5. By investing \$100—\$30=\$70, he will receive annually \$4+\$4=\$8 ; and  $\$8 \div \$70 = 11\frac{3}{7}$  % , *Ans.*
- Ex. 6. Since \$100 at 1 % will gain \$4, \$6, \$8, and \$10, in 4, 6, 8 and 10 years respectively, to gain \$100 will require  $100 \div 4 = 25$  % , for 4 years ;  
 $100 \div 6 = 16\frac{2}{3}$  % , “ 6 “  
 $100 \div 8 = 12\frac{1}{2}$  % , “ 8 “  
 $100 \div 10 = 10$  % , “ 10 “
- Ex. 7. Since to triple itself the interest must be twice the principal, any sum, as \$100, will triple itself in  
 2 years, at  $200 \div 2 = 100$  % ;  
 5 “ “  $200 \div 5 = 40$  % ;  
 7 “ “  $200 \div 7 = 28\frac{4}{7}$  % ;  
 12 “ “  $200 \div 12 = 16\frac{2}{3}$  % ;  
 20 “ “  $200 \div 20 = 10$  % .
- Ex. 8.  $\$760.50 \div \$7800 = 9\frac{3}{4}$  % , *Ans.*
- Ex. 9.  $\$223 \times 12 = \$2676$ , yearly income ;  
 $\$2676 \div \$35680 = 7\frac{1}{2}$  % , *Ans.*

(555, page 324.)

- Ex. 1.  $\$273.51 \times .07 = \$19.1457$ , interest for 1 yr.;  
 $\$312.864 - \$273.51 = \$39.354$ , whole interest;  
 $\$39.354 \div \$19.1457 = 2.0555 + \text{yr.} = 2 \text{ yr. } 20 \text{ da.}$
- Ex. 2.  $\$650.82 \times .05 = \$32.541$ , interest for 1 yr.;  
 $\$761.44 - \$650.82 = \$110.62$ , whole interest;  
 $\$110.62 \div \$32.541 = 3.3994 + \text{yr.}$   
 $= 3 \text{ yr. } 4 \text{ mo. } 24 \text{ da., Ans.}$
- Ex. 3. Since \$100 at 3 %,  $4\frac{1}{2}$  %, 6 %, 7 % and 10 %, will gain \$3,  $\$4\frac{1}{2}$ , \$6, \$7 and \$10, respectively, in 1 year, a sum will double itself in  
 $100 \div 3 = 33\frac{1}{3} \text{ yr. at } 3 \text{ \%}; 100 \div 4\frac{1}{2} = 22\frac{2}{9} \text{ yr. at } 4\frac{1}{2} \text{ \%};$   
 $100 \div 6 = 16\frac{2}{3} \text{ yr. at } 6 \text{ \%}; 100 \div 7 = 14\frac{2}{7} \text{ yr. at } 7 \text{ \%};$   
 $100 \div 10 = 10 \text{ yr. at } 10 \text{ \%}.$   
And quadruple itself in  $300 \div 3 = 100 \text{ yr. at } 3 \text{ \%};$   
 $300 \div 4\frac{1}{2} = 66\frac{2}{3} \text{ yr. at } 4\frac{1}{2} \text{ \%}; 300 \div 6 = 50 \text{ yr. at } 6 \text{ \%};$   
 $300 \div 7 = 42\frac{6}{7} \text{ yr. at } 7 \text{ \%}; 300 \div 10 = 30 \text{ yr. at } 10 \text{ \%}.$
- Ex. 4.  $\$9750 \times .02 = \$195$ , interest for 1 month;  
 $\$780 \div \$195 = 4 \text{ mo., Ans.}$
- Ex. 6.  $\$376.76 \div 333 = \$1.131414 + \text{amt. of } \$1$ ; and, referring to the table under  $2\frac{1}{2}$  %, we find that \$1 will amount to this sum (very nearly) in 5 terms of interest, or  $2\frac{1}{2}$  years, *Ans.*
- Ex. 7. We find by the table that it will require 11 years for \$1 at 6 % to gain \$.898299; and  $\$1 - \$.898299 = \$.101701$ , the interest still to be gained.  $\$.1898299 \times .06 = \$.113898$ , int. on last amount for 1 year.  $\$.101701 \div \$.113898 = .8929 \text{ yr.} = 10 \text{ mo. } 21 + \text{da.}$   
Hence, any sum will double itself at 6 % compound interest, in 11 yr. 10 mo. 21 da.  
Again, \$1 at 7 % compound interest will gain

\$ .967151 in 10 yr.; and  $\$1 - \$.967151 = \$.032849$ ,  
 the interest still to be gained;  $\$1.967151 \times .07$   
 $= \$.137701$  int., of last amount for 1 year;  $\$.032849$   
 $\div \$.137701 = .23858$  yr. = 2 mo. 26—da.

Hence, 10 yr. 2 mo. 26 da., *Ans.*

## DISCOUNT.

(557, page 325.)

Ex. 1.  $\$.10275$ , amount of  $\$1$  for 5 mo. 15 da.;

$\$.385.3125 \div .10275 = \$375$ , *Ans.*

Ex. 2.  $\$.10826527 +$ , amount of  $\$1$  for 1 yr. 6 mo. 1 da.;

$\$.429.986 \div .10826527 = \$397.160 -$ , present worth;

$\$.429.986 - \$397.16 = \$32.826$ , *Ans.*

Ex. 3.  $\$.112$ , amount of  $\$1$  for 1 yr. 6 mo.;

$\$.3665.20 \div .112 = \$3272.50$ ; cash value of sale;

$\$.3272.50 - \$2964.12 = \$308.38$ , *Ans.*

Ex. 4.  $\$.12000 \div 1.05 = \$11428.57 +$

$\$.15000 \div 1.125 = \$13333.33 +$

Latter offer,  $\$.24761.90 +$ , cash value;

$\$.25000 - \$24761.90 = \$238.10$  gained, *Ans.*

Ex. 5. From Apr. 1, 1860, to Sept. 4, 1860, is 5 mo. 3 da.;

“ “ “ “ “ Jan. 1, 1861, “ 9 mo.;

Discounting  $\$1470$  for 5 mo. 3 da. at 10 %, and  
 $\$.2816.80$  for 9 mo. at 10 %, we have

$\$.1470 \div 1.0425 = \$1410.07 +$  borrowed, payable  
 Sept. 4, 1860;  $\$.2816.80 \div 1.075 = \$2620.28 +$ ,  
 borrowed, payable Jan. 1, 1861;

(324, 325)

$\$1410.07 + 2620.28 = \$4030.35$ , whole loan;  
 Am't of  $\$1410.07 @ 7\%$ , Sept. 4, 1860,  $\$1452.02$   
       "      "       $2620.28$  "      "      Jan. 1, 1861,  $2757.84$

---

Money borrowed, with interest,  $\$4209.86$   
 $\$1470 + \$2816.80 = \$4286.80$ , money to be paid, if  
 the house and lot were bought on credit; hence,  
 $\$4286.80 - \$4209.86 = \$76.94$ , gain by borrowing  
 money to pay down.

Ex. 6  $\$576 \div 1.08 = \$533.33\frac{1}{3}$   
 $\$576 - \$533.33\frac{1}{3} = \$42.66\frac{2}{3}$ , discount;  
 $\$576 \times .08 = \$46.08$ , interest;

---

Difference,  $\$3.41\frac{1}{3}$ , *Ans.*

Ex. 7. The term of discount for the first sum is 6 mo. 25  
 da., and for the second, 11 mo. 14 da.; hence,  
 $\$243.16 \div 1.039861 = \$233.843 +$   
 $\$178.64 \div 1.066888 = 167.444 +$   


---

 $\$401.287 +$ , *Ans.*

Ex. 8.  $\$.09 \times 488 \times 120 = \$5270.40$ , cost;  
 $\$5270.40 \div 1.06 = \$4972.07 +$ , pres. worth of note;  
 $\$6441.60 - \$4972.07 = \$1469.53 -$ , *Ans.*

Ex. 9.  $\$6.25 \div 1.04 = \$6.009 +$ , present worth of  $\$6.25$ ;  
 $\$6.50 \div 1.06 = 6.132 +$ , " " "  $\$6.50$ ;

---

*Ans.*  $\$.123 \pm$ , difference in favor of  $\$6.25$

Ex. 10. 5 % per annum is  $3\frac{1}{3}\%$  for 8 mo.; hence  
 $\$6400 \times .03\frac{1}{3} = \$213.33\frac{1}{3}$ , discount;  
 $\$6400 - \$213.33\frac{1}{3} = \$6186.66\frac{2}{3}$ , to be hired;  
 $\$6186.66\frac{2}{3} \times .03\frac{1}{3} = \$206.22\frac{2}{3}$ , int. on hired money  
 $\$213.33\frac{1}{3} - \$206.22\frac{2}{3} = \$7.11\frac{1}{3}$ , *Ans.*

## BANKING.

(576, page 329.)

- Ex. 1. Int. of \$1487 at 6 % for 33 da. = \$8.18, discount;  
 $\$1487 - \$8.18 = \$1478.82$ , proceeds, *Ans.*
- Ex. 2. Int. of \$384.50 at 7 % for 93 da. = \$6.95, discount;  
 $\$384.50 - \$6.95 = \$377.55$ , proceeds, *Ans.*
- Ex. 3. Int. of \$975 at 8 % for 63 da. = \$13.65, discount;  
 $\$975 - \$13.65 = \$961.35$ , proceeds of note;  
 $\$1000 - \$961.35 = \$38.65$ , *Ans.*
- Ex. 4. 195 A. 2 R. 25 P. = 195.65625 A.;  
 $\$27.50 \times 195.65625 = \$5380.547$  +, face of note;  
 int. of \$5380.547 at 7 % for 4 mo. 18 da.  
 = \$144.378, discount;  
 $\$5380.547 - \$144.378 = \$5236.169$ , *Ans.*
- Ex. 5. From Aug. 26 to Nov. 29 is 95 da., the term of discount. Int. of \$1962.45 at 7 % for 95 da. = \$36.25;  $\$1962.45 - \$36.25 = \$1926.20$ , proceeds.
- Ex. 6. Int. of \$1066.75 at 6 % for 74 da. = \$13.16, disc't;  
 $\$1066.75 - \$13.16 = \$1053.59$ , proceeds.
- Ex. 7. Note due Aug.  $2\frac{0}{23}$ ; term of discount, 49 da.;  
 int. of \$784.72 at 8 % for 49 da. = \$8.54, discount,  
 $\$784.72 - \$8.54 = \$776.18$ , proceeds.
- Ex. 8. Int. of \$1845.50 at 24 % for 31 da. = \$38.14, disc't;  
 $\$1845.50 - \$38.14 = \$1807.36$ , proceeds.
- Ex. 9.  $\$950 \div 1.0175 = \$933.66$ , true present worth;  
 $\$950 - \$933.66 = \$16.34$ , true discount;  
 $\$950 \times .0175 = 16.63$ , bank discount;

---

\$ .29, *Ans.*

(329, 330)



- Ex. 10.  $\$1375.50 \div 1.01 = \$1361.88$ , true present worth;  
 $\$1375.50 - \$1361.88 = \$13.62$ , true discount;  
 $\$1375.50 \times .01 = 13.76$ , bank “  


---

 $\$ .14$ , *Ans.*

(577, page 330.)

- Ex. 1.  $\$1275 \div .9895 = \$1288.53 -$ , *Ans.*  
 Ex. 2.  $\$5000 \div .9845 = \$5078.72 +$ , *Ans.*  
 Ex. 3. The proceeds of \$1 for 3 mo. at 7 % are \$.9825;  
 $\$276.84 \div .9825 = \$281.77 +$ , *Ans.*  
 Ex. 4. The proceeds of \$1 for 4 mo. 3 da. at  $7\frac{1}{2}$  % are \$.974375  
 $\$1486.90 \div .974375 = \$1526 +$ , *Ans.*  
 Ex. 5. Proceeds of \$1 for 6 mo. 3 da. at 24 % = \$.878;  
 $\$496 \div .878 = \$564.92$ , *Ans.*  
 Ex. 6. Proceeds of \$1 for 33 da. at 5 % = \$.9954166 +,  
 $\$1200 \div .9954166 = \$1205.52 +$ , *Ans.*  
 Ex. 7. Proceeds of \$1 for 63 da. at 18 % = \$.9685;  
 $\$575 \div .9685 = \$593.70$ , *Ans.*  
 Ex. 8. Proceeds of \$1 for 110 da. at 12 % = \$.963 $\frac{1}{3}$ ;  
 $\$187.50 \div .963\frac{1}{3} = \$194.63 +$ , *Ans.*

(578, page 331.)

- Ex. 1. Discount of \$100 for 33 da. = \$.55;  
 $\$100 - \$.55 = \$99.45$ , proceeds;  
 interest on proceeds at 1 % = \$.0911625;  
 $\$.55 \div .0911625 = 6\frac{2}{3}\frac{2}{3}$  %, *Ans.*  
 Ex. 2. Discount of \$100 for 2 mo. 3 da. = \$4.20;  
 $\$100 - \$4.20 = \$95.80$ , proceeds;  
 interest on proceeds at 1 % = \$.16765;  
 $\$4.20 \div \$.16765 = 25\frac{2}{4}\frac{5}{79}$  %, *Ans.*

(330—332)

Ex. 3 Discount of \$100 for 93 da.=\$4.65;  
 \$100—\$4.65=\$95.35, proceeds;  
 interest on proceeds at 1 %=\$.24632 $\frac{1}{2}$ ;  
 \$4.65÷\$.24632 $\frac{1}{2}$ =18 $\frac{1}{9}$  $\frac{674}{7}$  %, *Ans.*

Ex. 4. *Ans.*, 5 $\frac{5}{3}$  %, 6 $\frac{6}{9}$  %, 7 $\frac{49}{113}$  %, 10 $\frac{10}{11}$  %, 13 $\frac{1}{3}$  %.

Ex. 5. *Ans.*, 9 $\frac{567}{3937}$  %, 12 $\frac{252}{979}$  %, 25 $\frac{25}{479}$  %, 31 $\frac{251}{379}$  %, 38 $\frac{394}{937}$

(579, page 332.)

Ex. 1.

\$.45 $\frac{5}{8}$ =int. of \$100 at 5 % for 33 da.;

\$.55 = " " " 6 % " "

\$.64 $\frac{1}{6}$ = " " " 7 % " "

\$.91 $\frac{2}{3}$ = " " " 10 % " "

$100.45\frac{5}{8} \times .0045\frac{5}{8}$   
 \$ \frac{\quad}{5} = \text{int. at 1 % of amt. of \$100 at 5 %};

$100.55 \times .0055$   
 \$ \frac{\quad}{6} = " " " " " 6 %;

$100.64\frac{1}{6} \times .0064\frac{1}{6}$   
 \$ \frac{\quad}{7} = " " " " " 7 %;

$100.91\frac{2}{3} \times .0091\frac{2}{3}$   
 \$ \frac{\quad}{10} = " " " " " 10 %;

Hence

$.45\frac{5}{8} \times \frac{5}{100.45\frac{5}{8} \times .0045\frac{5}{8}} = \frac{5}{1.0045\frac{5}{8}} = 4\frac{2}{3}\frac{56}{11} \% \text{ cor. to 5 \%};$

$.55 \times \frac{6}{100.55 \times .0055} = \frac{6}{1.0055} = 5\frac{1}{2}\frac{945}{11} \% \text{ " " 6 \%};$

$.64\frac{1}{6} \times \frac{7}{100.64\frac{1}{6} \times .0064\frac{1}{6}} = \frac{7}{1.0064\frac{1}{6}} = 6\frac{1}{2}\frac{538}{77} \% \text{ " " 7 \%};$

(332)

$$.91\frac{2}{3} \times \frac{10}{100.91\frac{2}{3} \times .0091\frac{2}{3}} = \frac{10}{1.0091\frac{2}{3}} = 9\frac{901}{1211} \% \text{ cor. to } 10 \%;$$

NOTE.—From the solution given above, we see that the result, after cancellation, is obtained, by dividing the given rate by the amount of \$1 for the given time.

Ex. 2.  $\$1.0206\frac{2}{3}$  = amt. of \$1 at 8 % for 3 mo. 3 da. ;  
 $.08 \div 1.0206\frac{2}{3} = 7\frac{1283}{1531} \%, \text{ Ans.}$

Ex. 3. 1 % per mo. = 12 % per annum ;

$1\frac{1}{2}$  " " = 18 " "

2 " " = 24 " "

$2\frac{1}{2}$  " " = 30 " "

$\$1.0210$  = amt. of \$1 for 63 da. at 12 % ,

$\$1.0315$  = " " " " 18 % ;

$\$1.0420$  = " " " " 24 % ;

$\$1.0525$  = " " " " 30 % ;

$.12 \div 1.021 = 11\frac{669}{1021} \%, \text{ to pay } 1 \% \text{ per mo. ;}$

$.18 \div 1.0315 = 17\frac{929}{2063} \%, \text{ " " } 1\frac{1}{2} \% \text{ " "}$

$.24 \div 1.042 = 23\frac{17}{521} \%, \text{ " " } 2 \% \text{ " "}$

$.30 \div 1.0525 = 28\frac{312}{421} \%, \text{ " " } 2\frac{1}{2} \% \text{ " "}$

Ex. 4.  $\$1.105$  = amt. of \$1 for 18 mo. at 7 % ;

$.07 \div 1.105 = 6\frac{74}{221} \%, \text{ Ans.}$

#### EXCHANGE.

(599, page 336.)

Ex. 1.  $\$1.005 - \$.0064\frac{1}{6} = \$.9985\frac{5}{6}$ , cost of exchange for \$1 ;  
 $\$5400 \times .9985\frac{5}{6} = \$5392.35 +, \text{ Ans.}$

Ex. 2.  $\$1 - \$.0325 = \$.9675$ , cost of exchange for \$1 ;  
 $\$3000 \times .9675 = \$2902.50, \text{ Ans.}$

(332—336)

Ex. 3.  $\$1.01375 - \$0.0155 = \$0.99825$ , cost exchange for \$1;  
 $\$4800 \times .99825 = \$4791.60$ , *Ans.*

Ex. 4.  $\$550.62 \div 1.035 = \$532$ , *Ans.*

Ex. 5.  $\$1.0175 - \$0.0064\frac{1}{6} = \$1.0110\frac{5}{6}$ , cost exchange for \$1;  
 $\$1324.74 \div \$1.0110\frac{5}{6} = \$1310.22$ —, *Ans.*

Ex. 6.  $\$7500 \times .015 = \$112.50$ , commission;  
 $\$7500 - \$112.50 = \$7387.50$ , net proceeds of sale;  
 $\$7387.50 \div 1.005 = \$7350.75$ —, *Ans.*

Ex. 7.  $\$4800 \times .005 = \$24$ , discount;  
 $\$4800 - \$24 = \$4776$  rec'd per dft. on Baltimore;  
 $\$4800 \div 1.0075 = 4764.27$  “ “ “ “ Hartford;  


---

 $\$11.73$ , *Ans.*

Ex. 8.  $\$508.75 \div 1.0175 = \$500$ , dividend;  
 $\$500 \div .0625 = \$8000 = 80$  shares, *Ans.*

Ex. 9.  $\$5075 - \$5000 = \$75$ , premium;  
 $\$75 \div \$5000 = .015 = 1\frac{1}{2} \%$ , rate of premium, *Ans.*

Ex. 10.  $\$5141.78 \div 5320 = \$0.9665$ , cost of exchange for \$1;  
 int. of \$1 for 63 da. = .01225  


---

 $\$.97875$ , course of exchange;  
 $\$1 - \$.97875 = \$.02125 = 2\frac{1}{8} \%$ , rate of discount.

(606, page 342.)

Ex. 1. £325 3 s. 9 d. = £325.1875;  
 $40 \times 1.0975$   
 $\text{£}325.1875 \times \frac{\quad}{9} = \$1586.19+$ , *Ans.*

Ex. 2.  $6000 \times \$.1875 = \$1125$ , *Ans.*

Ex. 3.  $\$.754 \times 1.0125 = \$.763425$ , course of exchange;  
 $3000 \text{ roubles} \times .763425 = \$2290.275$ , *Ans.*

(336—342)

Ex. 4.  $\$831.12 \div .96 = 865.75$  scudi  
 $= 865$  scudi 9 carlini, *Ans.*

Ex. 5.  $\$40 \times 1.08 = \text{£}9$ , course of exchange;  
 $\text{£}1 = \frac{\text{£}9}{40 \times 1.08}$ , cost of a unit of U. S. currency;  
 $\text{£}125 \div \frac{9}{40 \times 1.08} = \$600$ , *Ans.*

Ex. 6.  $\$7536.30 \div \frac{40 \times 1.11}{9} = \text{£}1527$  12 s.  $6\frac{3}{4}$  d., *Ans.*

Ex. 7. 9087 guilders 10 stivers  $= 9087.5$  guilders;  
 $9087.5 \div 2.5 = \$3635$ , *Ans.*

Ex. 8. 1 milree  $= \text{£}6\frac{4}{10}$ ;  $\text{£}2500 \div 6\frac{4}{10} = 9302.325\frac{2}{3}$   
 milrees  $= 9302$  milrees  $325\frac{2}{3}$  reis, *Ans.*

Ex. 9.  $\text{£}1736 \div 360 = \$4.82\frac{2}{3}$ , cost of  $\text{£}1$ ;  
 $\$4.82\frac{2}{3} - \$4.44\frac{4}{9} = \$.37\frac{7}{9}$ , premium;  
 $\$.37\frac{7}{9} \div \$4.44\frac{4}{9} = .085 = 8\frac{1}{2} \%$  premium, *Ans.*

Ex. 10.  $1500 \div .930 = \$1612.90$ , draft on Baltimore;  
 $1500 \times 1.065 = \$1597.50$ , “ “ Madeira;  
 Difference,  $\$15.40$ , *Ans.*

Ex. 11. 25256 lire 16 soldi  $= 25256.8$  lire;  
 $25256.8 \div 131 = 192.8$  oz. of fine gold required;  
 $192.8 \text{ oz.} \times 480 = 92544$  gr. “ “ “  
 $92544 \div 23.22 = \$3985.53$ , value of gold in U. S. coin,  
 $\$3985.53 \times .03 = \$119.57$ , cost of exportation;  
 $\$3985.53 + \$119.57 = \$4105.10$ , cost of goods, paid  
 in gold;  $25256.8 \times \$.16 = \$4041.09$ , cost of goods,  
 paid by draft on Leghorn;  
 $\$4105.10 - \$4041.09 = \$64.01$ , *Ans.*



**Ex. 12.** In £ 1 there are 240 d.; and since 67 d.=1 oz. of pure silver 240 d. are equal to  $240 \div 67 = 3.58209$  + oz.=1719.4032 gr. of fine silver. But in the coinage of 1853, 1 half dollar= $192 \times .9 = 172.8$  gr of fine silver; and 1 dollar=345.6 gr.; hence  $1719.4032 \div 345.6 = \$4.975$ , *Ans.*

**Ex. 13.** From the table we find that the intrinsic value of 1 thaler is \$.692 in the coinage of 1837; hence  $$.692 \times 125 = \$86.50$ , intrinsic value of 125 thalers;  $\$88.23 - \$86.50 = \$1.73$ , premium;  $\$1.73 \div \$86.50 = .02 = 2 \%$ , *Ans.*

(608, page 346.)

**Ex. 1.** (?) roubles=\$5000  
 $\$40 \times 1.10 = \text{£}9$   
 $\text{£}1 = 6.48$  roubles  
 1.0025

(?)=6610 roubles 74 copecks, *Ans.*

**NOTE.**—Since *proceeds*, or the value of the money in the place where exchange *ends*, is required, we place 1 plus the rate of brokerage on the left.

**Ex. 2.** (?) \$=7680 marcs  
 5.16 francs=\$1  
 1 marc =  $2\frac{1}{8}$  francs  


---

 (?)=\$3162.79, *Ans.*

**Ex. 3.** (?) C.=\$750 N. O.  
 1 N. O.=.9875 C.  


---

 (?)=\$740.625, proceeds by direct exchange;  
 (?) C.=\$750 N. O.  
 1 N. Y.= 1.015 C.  
 1 N. O.= .99 N. Y.  
 .995

(343—346)

$$\begin{array}{r} (?) = \$749.87, \text{ proceeds by arbitration;} \\ 740.63 \\ \hline \end{array}$$

*Ans.* \$9.24+, gained by arbitration.

**Ex. 4.**  $(?) \$ = 6000 \text{ guilders}$

$$11\frac{1}{4} \text{ guilders} = £1$$

$$£9 = \$40 \times 1.0925$$

$$1.0125$$

$$\begin{array}{r} (?) = \$2557.66+, \text{ proceeds by arbitration;} \\ 6000 \times .415 = 2490, \quad \text{" " direct ex.;} \\ \hline \end{array}$$

*Ans.* \$67.66, gain by arbitration.

**Ex. 5.**  $(?) \$ = 1 \text{ franc}$

$$£9 = \$40 \times 1.09\frac{3}{8}$$

$$26.86 \text{ francs} = £1$$

$$(?) = \$1.181-, \text{ Ans.}$$

**Ex. 6.**  $(?) \text{ guilders} = \$6400$

$$\$40 \times 1.08 = £9$$

$$£1 = 240 \text{ d.}$$

$$18 \text{ d.} = 1 \text{ gilder}$$

$$1.005 \quad .995$$

$$\begin{array}{r} (?) = 17600 \text{ guilders } 17+ \text{ stivers, proceeds arbitration} \\ \$6400 \div .40 = 16000 \quad \text{" " direct ex.;} \\ \hline \end{array}$$

1600 guilders 17 stivers, *Ans.*

**Ex. 7.**  $\$5800 \times .95 = \$5510$ , value of stock in N. O.;

$$(?) \text{ P.} = \$5510 \text{ N. O.}$$

$$1 \text{ N. Y.} = 1.02 \text{ P.}$$

$$1 \text{ N. O.} = .995 \text{ N. Y.}$$

$$1.0025$$

$$(?) = \$5606.08, \text{ Ans.}$$

Ex. 8. (?) £=\$3000

$$\$1 = 5.40 \text{ f.}$$

$$185 \text{ f.} = 100 \text{ m.}$$

$$2 \text{ m.} = 35\text{s.}$$

$$220\text{s.} = £1$$

$$\begin{array}{rcl} (?) & = & £696 \text{ 11s. 2d., proceeds by arbitration;} \\ \$3000 \times 9 & & \\ \hline 40 \times 1.10 & = & 613 \text{ 12s. 9d., " by direct exchange;} \\ & & £82 \text{ 18s. 5d., gain by arbitration.} \end{array}$$

## EQUATION OF PAYMENTS.

(617, page 349.)

Ex. 1.

$$\$500 \times 30 = \$15000$$

$$400 \times 60 = 24000 \quad 93000 \div 1500 = 62 \text{ da., term of credit;}$$

$$600 \times 90 = 54000$$

$$\text{Jan. 1} + 62 \text{ da.} =$$

$$\text{Mar. 3, 1860, equated time.}$$

$$\$1500$$

$$\$93000$$

Ex 2.  $\frac{1}{3} + \frac{1}{4} = \frac{7}{12}$ ;  $1 - \frac{7}{12} = \frac{5}{12}$ ;

$$\frac{1}{3} \times 3 = 1$$

$$\frac{1}{4} \times 8 = 2$$

$$\frac{5}{12} \times 12 = 5$$

$$8 \div 1 = 8 \text{ mo., Ans.}$$

$$1$$

$$8$$

Ex. 3.  $\$480 \times 90 = \$43200$

$$320 \times 60 = 19200$$

$$\$800$$

$$\$62400$$

$$62400 \div 800 \div 78 \text{ da., average term of credit;}$$

hence the note for the whole amount will run

$$365 \text{ da.} - 78 \text{ da.} = 287 \text{ da. Again,}$$

(347—350)

$\$480 \div 1.015 = \$472.906$ , present worth of  $\$480$ ;

$\$320 \div 1.01 = 316.831$ , “ “ “ 320;

$\$789.737$ , present worth both debts;

Amount of  $\$800$  for 287 da. =  $\$838.266$

“  $\$789.737$  for 1 yr. =  $837.121$

$\$ 1.14 +$ , *Ans.*

Ex. 4.

$\$280 \times 3 = \$ 840$

$300 \times 4 = 1200$   $6400 \div 1340 = 4$  mo. 23 da., average Cr.;

$200 \times 5 = 1000$  Apr. 1 + 4 mo. 23 da. = Aug. 24, *Ans.*

$560 \times 6 = 3360$

$\$1340$

$\$6400$

(618, page 352.)

Ex. 1.

Due.	Da.	Items.	Prod.
Mar. 4	0	250	
“ 25	21	360	7560
Apr. 16	43	96	4128
“ 30	57	200	11400
May 17	74	350	25900
		1256	48988

$48988 \div 1256 = 39$  da.;

Mar. 4 + 39 da. =

Apr. 12, 1860, *Ans.*

Ex. 2.

Due.	Da.	Items.	Prod.
Oct. 12, 1859	0	180	
Nov. 6, “	25	300	7500
Jan. 15, 1860	95	150	14250
Mar. 19, “	159	350	55650
Feb. 24, “	135	130	17550
Mar. 25, “	165	150	23100
		1250	118050

$118050 \div 1250 = 94$

da.; Oct. 12, 1859

+ 94 da. =

Jan. 14, 1860, *Ans.*

Ex. 3.

Due.	Da.	Items.	Prod.
Nov. 30, 1860		240	
Jan. 11, 1861	42	500	21000
Feb. 23, “	85	436	37060
Mar. 17, “	107	325	34775
Apr. 25, “	146	436	63656
May 16, “	167	537	89679
		2474	246170

$246170 \div 2474$

= 100 da.;

Nov. 29, 1860 +

100 da. =

Mar. 10, '61, *Ans.*

Ex. 4.

Due.	Da.	Items.	Prod.
Aug. 16, 1859		250	
Oct. 15, "	60	250	15000
Dec. 14, "	120	300	36000
Feb. 12, 1860	180	248	44640
		1148	95640

$95640 \div 1148 = 83$   
 da.; Aug. 16, 1859  
 $+ 83 \text{ da.} = \text{Nov. 7, 1859, Ans.}$

(620, page 356.)

Ex. 2.

Due.	Da.	Items.	Prod.	Due.	Da.	Items.	Prod.
Mar. 1	0	436		May 27	87	400	34800
Apr. 12	42	548	23016	" 9	69	650	44850
July 16	137	312	42744	June 20	111	200	22200
Sept. 14	197	536	105592	Aug. 3	155	84	13020
		1832	171352			1334	114870
		1334	114870				
		498	56482				

Balances,

 $56482 \div 498 = 113 \text{ da. ;}$ 
 $\text{Mar. 1, 1860} + 113 \text{ da.} = \text{June 22, 1860, due.}$ 

Ex. 3.

Focal date.

Due.	Da.	Items.	Int.	Due.	Da.	Items.	Int.
Apr. 1	85	54.86	.77	Apr. 1	85	50.00	.71
" 12	74	28.45	.35	June 18	7	30.00	.03
Mar. 16	101	95.75	1.61	" 12	13	125.00	.27
June 25	0	26.82		" 20	5	150.00	.13
		204.88	2.73			355.00	1.14
			1.14			204.88	
		Balances,	1.59			150.12	

$\text{Int. on } \$150.12 \text{ for 1 da.} = \$0.02502 ; \$1.59 \div \$0.02502$   
 $= 64 \text{ da. ; } \text{June 25, 1858} + 64 \text{ da.} = \text{Aug. 28, 1859.}$

Ex. 4.

Due.	Da.	Items.	Int.	Due.	Da.	Items.	Int.
Jan. 1	95	36.72	.58	Jan. 10	86	93.72	1.42
Feb. 1	64	48.25	.51	" 21	75	25.84	.32
Mar. 17	20	72.36	.24	Mar. 23	14	15.17	.04
Apr. 1	5	98.48	.08	Apr. 6	0	8.96	
		255.81	1.41			148.69	1.78
		148.69					1.41
		Balance of Items,	107.12			Balance of Int.,	.37

$\text{Int. of } \$107.12 \text{ for 1 da.} = .018 ;$   
 $\$.37 \div \$.018 = 20 \text{ da., Ans.}$

(352-356)



Ex. 5.

Due.	Da.	Items.	Prod.	Due.	Da.	Items.	Prod.
Apr. 25	24	1000	24000	Apr. 1	0	500	
				" 21	20	324	6480
		1000	24000			584	
		884	6480				
Balances,		116	17520				

$$17520 \div 116 = 151 \text{ da.}; \text{ Apr. 1.} + 151 \text{ da.} = \text{Aug. 30.}$$

Ex. 6.

Due.	Da.	Items.	Prod.	Due.	Da.	Items.	Prod.
Aug. 12	11	684	7524	Aug. 1	0	839	
Oct. 15	75	468	35100				
		1152	42624			839	
		839					
Balances,		313	42624				

$$42624 \div 313 = 136 \text{ da.};$$

$$\text{Aug. 1.} + 136 \text{ da.} = \text{Dec. 15, Ans.}$$

Ex. 7.

Due.	Da.	Items.	Prod.	Due.	Da.	Items.	Prod.
Mar. 1	0	500		Apr. 1	31	1000	31000
June 1	92	800	73600				
Aug. 1	153	600	91800				
		1900	165400			1000	31000
		1000	31000				
Balances,		900	134400				

$$134400 \div 900 = 149;$$

$$\text{Mar. 1.} + 149 \text{ da.} = \text{July 28, Ans.}$$

Ex. 8.

Due.	Da.	Items.	Prod.
Apr. 12	0	500	
Sept. 20	161	1000	161000
		1500	161000

$$161000 \div 1500 =$$

$$107 \text{ da.}; \text{ Apr. 12.} +$$

$$107 \text{ da.} = \text{July 28,}$$

the average maturity of the two debts. Hence to discharge the whole obligation by two equal payments at an interval of 60 da., these payments must be made, one 30 da. *before* July 28, and the other 30 da. *after* July 28; and we have

$$\text{July 28} - 30 \text{ da.} = \text{June 28, date of 1st payment;}$$

$$\text{July 28} + 30 \text{ da.} = \text{Aug. 27, " 2d "}$$

(356, 357)

Ex. 9.

Due.	Da.	Items.	Prod.	Due.	Da.	Items.	Prod.
Sept. 12	0	530.84		Sept. 14	2	436	872
" 20	8	236.48	1892	" 25	13	320	4160
" 30	18	739.56	13312	Oct. 3	21	560	11760
Oct. 5	23	273.44	6289	" 17	35	370	12950
" 6	34	194.78	6623	Nov. 16	65	840	54600
" 29	47	536.42	25212	" 24	73	560	40880
		2511.52	53328			3085	12522
						2511.52	53328
				Balances,		574.48	71894

$$71894 \div 574.48 = 125 \text{ da. ;}$$

Sept. 12, 1859 + 125 da. = Jan. 15, 1860, *Ans.*

Ex. 10.

Due.	Da.	Items.	Prod.	Due.	Da.	Items.	Prod.
June 1	0	536.78		June 3	2	500	1000
July 16	45	216.94	97063	July 1	30	1000	30000
Aug. 12	72	843.75	60750	Nov. 1	153	1500	229500
Sept. 12	103	94.37	61220				
Nov. 18	170	856.48	145602				
		4988.32	364635			3000	260500
		3000.00	260500				
Balances,		1988.32	104135				

$$104135 \div 1988.32 = 52 \text{ da. ;}$$

June 1 + 52 da. = July 23, *Ans.*

## ACCOUNT SALES.

(625, page 358.)

Ex. 1. We first average the sales, using Apr. 1, the earliest maturity of the entire account, for a focal date, thus :

Due.	Da. from Apr. 1.	Items	Prod.
May 15	44	4368.00	192192
" 5	34	5344.80	181723
June 28	88	2650.00	321200
		13362.80	695115

$$695115 \div 13362.80 = 52 \text{ da. ;}$$

Apr. 1. + 52 da. = May 23, date for commission and guaranty. We now average the entire account, using the same focal date as before, and putting

(357, 358)

Freight, Primage, Wharfage and Cartage, as one item; and also, commission and guaranty.

Due.	Da.	Items.	Prod.	Due.	Da.	Items.	Prod.
Apr. 1	0	185.30		May 15	44	43680.00	192192
June 3	63	3207.07	202045	" 5	34	5344.80	181723
June 28	88	37.68	3315	June 28	88	3650.00	321200
May 23	52	443.27	22050				
		3873.32	228410			13362.80	695115
						3873.32	228410
						9489.48	466705

466705 ÷ 9489.48 = 49 da.; Balances,  
Apr. 1 + 49 da. = May 20, proceeds due.

Ex. 2. Equation for the average of sales.

Due.	Da. from May 1.	Items.	Prod.
June 3	33	1250	41250
" 30	60	2275	136500
July 29	89	2450	218050
Aug. 6	97	500	29100
		6275	424900

424900 ÷ 6275 = 68 da. May 1  
+ 68 da. = July 8, date for com-  
mission; \$175.48 + \$56.25 +  
\$8.37 = \$240.10, charges made  
May 1, for freight, etc.

Storage on 200 bbl. 5 wk. = storage on 1 bbl. 1000 wk.;

" " 350 " 9 " = " " " 3150 "

" " 400 " 13 " = " " " 5200 "

" " 50 " 14 " = " " " 700 "

10050 wk.

10050 × .02 = \$201 storage, due Aug. 6;

\$6275 × .035 = \$219.63 commission, due July 8.

Due.	Da.	Items.	Prod.	Due.	Da.	Items.	Prod.
May 1	0	240.10		June 3	33	1250.00	41250
Aug. 6	97	201.00	19497	" 30	60	2275.00	136500
July 8	68	219.62	14935	July 29	89	2450.00	218050
				Aug. 6	97	300.00	29100
		660.72	34422			6275.00	424900
						660.72	34432
						5614.28	390468

390468 ÷ 5614.28 =

Balances,

70 da.; May 1 + 70 da. = July 10, proceeds due.

## SETTLEMENT OF ACCOUNTS CURRENT.

(626, page 360.)

Ex. 1.

Due.	Da.	Items.	Int.	Cash val.	Due.	Da.	Items.	Int.	Cash val.
Jan. 12	140	500.36+	11.67	512.03	Jan. 1	151	536.72+	13.51	550.23
" 26	126	250.48+	5.26	255.74	Feb. 3	118	486.57+	9.57	496.14
Feb. 13	108	400.00+	7.20	407.20	Mar. 26	67	1200.78+	14.08	1274.86
Mar. 16	77	750.00+	9.63	759.63	Apr. 20	42	756.36+	5.29	761.65
Apr. 25	37	200.00+	1.23	201.23	May 12	20	248.79+	.83	249.62
				2135.83					3332.50

$$\$3332.50 - \$2135.83 = \$1196.67, \text{ Ans.}$$

Ex. 2.

Due.	Da.	Items.	Int.	Cash val.	Due.	Da.	Items.	Int.	Cash value.
Sept. 3	119	478.36+	11.07	489.43	Sept. 17	105	96.54+	1.97	98.51
Jan. 2	2	256.37--	.10	256.27	" 20	102	200.00+	3.97	203.97
" 21	21	375.26--	1.53	373.73	Oct. 3	89	325.00+	5.62	330.62
Feb. 12	43	80.00--	.67	79.33	Nov. 17	44	50.00+	.43	50.43
Dec. 15	16	148.76+	.46	149.22	Dec. 27	4	84.00+	.07	84.07
				1347.98					767.60

$$\$1347.98 - \$767.60 = \$580.38, \text{ Ans.}$$

## PARTNERSHIP.

(629, page 361.)

Ex. 1.  $\$6470 + \$3780 + \$9860 = \$20110$

$$\$20110 : \$6470 = \$7890 : (?) = \$2538.453, \text{ A's share}$$

$$\$20110 : \$3780 = \$7890 : (?) = \$1483.053, \text{ B's "}$$

$$\$20110 : \$9860 = \$7890 : (?) = \$3868.493, \text{ C's "}$$

Ex. 2.  $\$1847.50 - \$739 = \$1108.50, \text{ C pays ;}$

$$\frac{739.00}{1847.50} = \frac{2}{5}, \text{ B's fraction ; } \frac{1108.50}{1847.50} = \frac{3}{5}, \text{ C's fraction ;}$$

$$\$375 \times \frac{2}{5} = \$150, \text{ B's gain ;}$$

$$\$375 \times \frac{3}{5} = \$225, \text{ C's "}$$

(360, 361)

Ex. 3.  $\$10000 \quad \frac{10000}{26000} = \frac{25}{65}, \text{ A's fraction;}$   
 $12800 \quad \frac{12800}{26000} = \frac{32}{65}, \text{ B's "}$   
 $3200 \quad \frac{3200}{26000} = \frac{8}{65}, \text{ C's "}$

---

 $\$26000$

$$\begin{aligned} &\$9400 - (\$1500 + \$3400) = \$4500, \text{ net profits;} \\ &\$4500 \times \frac{25}{65} = \$1730.77, \text{ A's share of net profits;} \\ &\$4500 \times \frac{32}{65} = 2215.38, \text{ B's " " " } \\ &\$4500 \times \frac{8}{65} = 553.85, \text{ C's " " " } \\ &\$553.85 + \$1500 = \$2053.85, \text{ C's whole income.} \end{aligned}$$

Ex. 4.  $115 \text{ A. } 32 \text{ P.} = 115.2 \text{ A.}; \$3.75 \times 115.2 = \$432, \text{ rent;}$   
 $144 + 160 + 192 + 324 = 820 \text{ sheep;}$   
 $820 : 144 = \$432 : (?) = \$75.86, \text{ A pays;}$   
 $820 : 160 = \$432 : (?) = \$84.29, \text{ B "}$   
 $820 : 192 = \$432 : (?) = \$101.15, \text{ C "}$   
 $820 : 324 = \$432 : (?) = \$170.69, \text{ D "}$

Ex. 5.  $\$6 + \$4 + \$2 = \$12$   
 $\$2640 \times \frac{6}{12} = \$1320, \text{ B's share;}$   
 $\$2640 \times \frac{4}{12} = 880, \text{ C's "}$   
 $\$2640 \times \frac{2}{12} = 440, \text{ D's "}$

Ex. 6.  $\$6300 \times \frac{1}{7} = \$900, \text{ A's; } \$6300 \times \frac{1}{5} = 1260, \text{ B's;}$   
 $\$6300 \times \frac{2}{9} = \$1400, \text{ C's; } \$900 + \$1400 = \$2300, \text{ D's}$   
 $\$6300 - (\$900 + \$1260 + \$1400 + \$2300) = \$440$   
for E and F;  
 $\$440 \times \frac{3}{8} = \$165, \text{ E's; } \$440 \times \frac{5}{8} = \$275, \text{ F's.}$

Ex. 7.  $\frac{2}{3} : \frac{5}{6} = \frac{4}{6} : \frac{5}{6} = 4 : 5; 4 + 5 = 9;$   
 $\$90 \times \frac{4}{9} = \$40, \text{ share of first;}$   
 $\$90 \times \frac{5}{9} = 50, \text{ " second.}$

Ex. 8. If the younger has 8 shares,  
the elder will have 9 "

---

17, sum of shares;



$$\begin{aligned} \$5463.80 \times \frac{8}{17} &= \$2571.20, \text{ the younger receives;} \\ \$5463.80 \times \frac{9}{17} &= 2892.60, \text{ the elder} \quad " \end{aligned}$$

- Ex. 9.  $\$1680 - \$840 = \$840$ , A and B's gain; and since C's gain is equal to A and B's gains together, his stock must be  $\$12000 + \$8000 = \$20000$ ;  
 $\$840 \times \frac{8}{20} = \$336$ , A's gain;  
 $\$840 \times \frac{12}{20} = \$504$ , B's " "

- Ex. 10. Since the portions of the stock which they severally put in, are proportioned to their gains respectively, we have  $\$2000 + \$2800.75 + \$1685.25 + \$1014 = \$7500$ , whole gain;  
 $\$7500 : \$2000 = \$22500 : (?) = \$6000$ , A's stock;  
 $\$7500 : \$2800.75 = \$22500 : (?) \times \$8402.25$ , B's "  
 $\$7500 : \$1685.25 = \$22500 : (?) = \$5055.75$ , C's "  
 $\$7500 : \$1014 = \$22500 : (?) = \$3042$ , D's " "

- Ex. 11.  $\frac{1}{6} : \frac{2}{5} : \frac{4}{9} : \frac{1}{3} = \frac{15}{90} : \frac{36}{90} : \frac{40}{90} : \frac{30}{90} = 15 : 36 : 40 : 30$   
 $15 + 36 + 40 + 30 = 121$ , sum of proportional terms;  
 $\$30000 \times \frac{15}{121} = \$3719 \frac{1}{121}$ , share of 1st;  
 $\$30000 \times \frac{36}{121} = 8925 \frac{75}{121}$ , " " 2d;  
 $\$30000 \times \frac{40}{121} = 9917 \frac{43}{121}$ , " " 3d;  
 $\$30000 \times \frac{30}{121} = 7438 \frac{2}{121}$ , " " 4th.

- Ex. 12.  $\$71.27 + \$142.54 = \$213.81$ , gain of A and B;  
 $\$1200 - \$500 = \$700$ , stock of A and B;  
 $\$700 : \$500 = \$213.81 : (?) = \$152.72 \frac{1}{7}$ , C's gain;  
 $\$213.81 : \$71.27 = \$700 : (?) = \$233.33 \frac{1}{3}$ , A's stock  
 $\$213.81 : \$142.54 = \$700 : (?) = \$466.66 \frac{2}{3}$ , B's " "

- Ex. 13.  $3 + 5 + 7 = 15$ ;  $\$18840 \times \frac{7}{15} = \$8792$ , C's stock;  
 $\$8792 \times \frac{3}{15} = \$1758.40$ , A's gain;  
 $\$8792 \times \frac{5}{15} = 2930.66 \frac{2}{3}$ , B's "  
 $\$8792 \times \frac{7}{15} = 4102.93 \frac{1}{3}$ , C's " "

Ex. 14.  $\frac{3}{4}$ ,  $\frac{9}{10}$ ,  $\frac{13}{20} = \frac{15}{20}$ ,  $\frac{18}{20}$ ,  $\frac{13}{20}$ ; and these fractions are proportioned to 15, 18 and 13.

Hence, A and B receive 15 shares,

A " C " 18 "

B " C " 13 "

—

A, B and C receive  $\frac{1}{2}$  of 46=23 shares; and

A will receive 23—13=10 shares,

B " " 23—18= 5 "

C " " 23—15= 8 " . Hence

A has  $\frac{10}{23}$  of \$26.45=\$11.50;

B "  $\frac{5}{23}$  of \$26.45= 5.75;

C "  $\frac{8}{23}$  of \$26.45= 9.20.

(630, page 364.)

Ex. 1.  $\$357 \times 5 = \$1785$ , A's product;

$371 \times 7 = 2597$ , B's "

$154 \times 11 = 1694$ , C's "

—  
\$6076

\$6076 : \$1785 = \$347.20 : (?) = \$102, A's gain;

\$6076 : \$2597 = \$347.20 : (?) = \$148.40, B's "

\$6076 : \$1694 = \$347.20 : (?) = \$ 96.80, C's "

Ex. 2.  $5 \times 12 = 60$  cows for 1 week = A's use of pasture;

$4 \times 10 = 40$  " " " = B's " "

$6 \times 8 = 48$  " " " = C's " "

—  
148 " " "

$\$55.50 \times \frac{60}{148} = \$22.50$ , A pays

$\$55.50 \times \frac{40}{148} = 15$  , B "

$\$55.50 \times \frac{48}{148} = 18$  , C "

(363, 364)

Ex. 3.  $\$4500 - \$1800 = \$2700$ , B's gain;  
 $\$15000 \times 12 = \$180000$ , B's capital for 1 mo.;  
 $\$2700 \div 180000 = \$.015$  gain per month on \$1;  
 $\$.015 \times 9 = \$.135$ , gain on \$1 for 9 mo., or C's time;  
 $\$1800 \div .135 = \$13333.33\frac{1}{3}$ , value of C's land;  
 $\$13333\frac{1}{3} \div 125 = \$106\frac{2}{3}$ , value of land per acre, *Ans.*

Ex. 4.  $\$4200 \times 9 = \$37800$        $\$1500 \times 6 = \$9000$   
 $\$4400 \times 7 = 30800$        $\$1000 \times 10 = 10000$

---

A's product, \$68600;      B's product, \$19000  
 $\$68600 + \$19000 = \$87600$ , sum of products;  
 $\$876 : \$686 = \$772.20 : (?) = \$604.71$ , A's gain;  
 $\$876 : \$190 = \$772.20 : (?) = \$167.49$ , B's "

Ex. 5.  $30 \times 12 \times 9 = 3240$  hours' work by 1st company;  
 $32 \times 15 \times 10 = 4800$  " " " 2d "  
 $28 \times 18 \times 11 = 5544$  " " " 3d "  
 $20 \times 15 \times 12 = 3600$  " " " 4th "  


---

17184 " " " all.

$\$1500 \times \frac{3240}{17184} = \$282.82$ , wages of 1st company;  
 $\$1500 \times \frac{4800}{17184} = 418.99$ , " " 2d "  
 $\$1500 \times \frac{5544}{17184} = 483.94$ , " " 3d "  
 $\$1500 \times \frac{3600}{17184} = 314.25$ , " " 4th "

Ex. 6. To avoid fractions, suppose A had  $\$5 \times 6 = \$30$ , and  
B had  $\$8 \times 6 = \$48$ . Then

$\$30 \times 4 = \$120$        $\$48 \times 4 = \$192$   
 $\$15 \times 8 = 120$        $\$16 \times 8 = 128$

---

\$240, A's prod.;      \$320, B's prod.;  
 $\$240 + \$320 = \$560$ , sum of products;  
 $\$4000 \times \frac{240}{560} = \$1714\frac{2}{7}$ , A's,  
 $\$4000 \times \frac{320}{560} = 2285\frac{5}{7}$ , B's.

(364, 365)

Ex. 7.  $\$15800 \times 4 = \$63200$   
 $14600 \times 2 = 29200$   
 $13100 \times 4 = 52400$   
 $14100 \times 8 = 112800$   $\$257600$ , B's prod.;  


---

 $\$25000 \times 6 = \$150000$   
 $23000 \times 4 = 92000$   
 $21500 \times 1 = 21500$   
 $22300 \times 7 = 156100$   $419600$ , C's prod.;  


---

 $\$30000 \times 7 = \$210000$   
 $31800 \times 3 = 95400$   
 $26800 \times 8 = 214400$   $519800$ , D's prod.;  


---

 $\$1197000$ , sum of products;

$$\$15000 \times \frac{2576}{11970} = \$3228.07, \text{ B receives;}$$

$$\$15000 \times \frac{4196}{11970} = 5258.15, \text{ C "}$$

$$\$15000 \times \frac{5198}{11970} = 6513.78, \text{ D "}$$

Ex. 8 C put in  $1 - (\frac{1}{2} + \frac{2}{5}) = \frac{1}{10}$  for 1 year; hence

$$\frac{1}{2} \times \frac{3}{4} = \frac{3}{8}, \text{ A's product;}$$

$$\frac{2}{5} \times \frac{1}{2} = \frac{1}{5}, \text{ B's "}$$

$$\frac{1}{10} \times 1 = \frac{1}{10}, \text{ C's "}$$

But  $\frac{3}{8}$ ,  $\frac{1}{5}$  and  $\frac{1}{10} = \frac{15}{40}$ ,  $\frac{8}{40}$  and  $\frac{4}{40}$ ; and these fractions are proportional to 15, 8 and 4; hence

$$15 + 8 + 4 = 27, \text{ sum of proportional terms;}$$

$$\$5400 \times \frac{15}{27} = \$3000, \text{ A's share of the gain;}$$

$$\$5400 \times \frac{8}{27} = 1600, \text{ B's " " " "}$$

$$\$5400 \times \frac{4}{27} = 800, \text{ C's " " " "}$$

$$\$5400 \times \frac{1}{2} = 2700, \text{ stock A put in;}$$

$$\$5400 \times \frac{2}{5} = 2160, \text{ " B " "}$$

$$\$5400 \times \frac{1}{10} = 540, \text{ " C " "}$$

$$\$3000 + \$2700 = \$5700, \text{ A's share of entire stock;}$$

$$\$1600 + \$2160 = 3760, \text{ B's " " " "}$$

$$\$800 + \$540 = 1340, \text{ C's " " " "}$$

- Ex. 9.  $\$456 \div 10 = \$45.60$ , A's monthly profit;  
 $\$343.20 \div 8 = 42.90$ , B's " "  
 $\$750 \div 12 = 62.50$ , C's " "

Now, their respective amounts of capital must be proportional to their monthly profits; hence

$$\$45.60 + \$42.90 + \$62.50 = \$151;$$

$$\$151 : \$45.60 = \$14345 : (?) = \$4332, \text{ A's capital};$$

$$\$151 : \$42.90 = \$14345 : (?) = \$4075.50, \text{ B's "}$$

$$\$151 : \$62.50 = \$14345 : (?) = \$5937.50, \text{ C's "}$$

- Ex. 10. C will have  $1 - (\frac{1}{10} + \frac{2}{5}) = \frac{1}{2}$  of the profits;

$$\frac{1}{10} \div 4 = \frac{1}{40}, \text{ B may claim for 1 mo.};$$

$$\frac{1}{2} \div 8 = \frac{1}{16}, \text{ C " " " "}$$

$$\frac{2}{5} \div 6 = \frac{1}{15}, \text{ D " " " "}; \text{ hence}$$

$$\frac{1}{15} : \frac{1}{40} = \$6000 : (?) = \$2250, \text{ B put in};$$

$$\frac{1}{15} : \frac{1}{16} = \$6000 : (?) = \$5625, \text{ C " "}$$

- Ex. 11.  $\$2400 - \$1920 = \$480$ , A's gain;

$$\$2080 - \$1280 = 800, \text{ C's "}$$

Now, since the gain varies as the product of the capital and time, we have the compound proportion

$$\left\{ \begin{array}{c} 1920 \\ 6 \end{array} \right. : \left\{ \begin{array}{c} 1280 \\ (?) \end{array} \right. = \$480 : \$800$$

$$(?) = \frac{1920 \times 6 \times 800}{1280 \times 480} = 15 \text{ mo., C's time.}$$

Again, since A gained \$480 in 6 mo., he would have gained  $\$480 \times 2 = \$960$  in 12 mo., B's time; and his stock and gain together would have been  $\$1920 + \$960 = \$2880$ ; hence

$$\$2880 : \$1920 = \$4800 : (?) = \$3200, \text{ B's stock.}$$



## ALLIGATION.

(633, page 366.)

Ex. 1. \$ .60  $\times$  4 = \$2.40

.70  $\times$  3 = 2.10

1.10  $\times$  1 = 1.10

1.20  $\times$  2 = 2.40

---

10 ) \$8.00

---

*Ans.* \$8.00

Ex. 2. \$0  $\times$  14 = \$ 0.00

.75  $\times$  12 = 9.00

.90  $\times$  24 = 21.60

1.10  $\times$  16 = 17.60

---

66 ) \$48.20

---

*Ans.* \$.73  $\frac{1}{3}$ .

Ex. 3. 3 lb. 6 oz. = 42 oz. ;

4 " 8 " = 56 "

3 " 9 " = 45 "

2 " 2 " = 26 "

23  $\times$  42 = 966 carats ;

21  $\times$  56 = 1176 "

20  $\times$  45 = 900 "

0  $\times$  26 = 0 "

---

169 ) 3042 "

---

18 carats, *Ans.*

Ex. 4. \$1.20  $\times$  15 = \$18.00

1.10  $\times$  5 = 5.50

.90  $\times$  5 = 4.50

.70  $\times$  10 = 7.00

---

35 ) \$35.00

worth of 1 bu., \$1.00 ; \$1.25 — \$1 = \$.25, *Ans.*

Ex. 5. \$.05  $\times$  17 = \$ .85

.08  $\times$  51 = 4.08

.10  $\times$  68 = 6.80

.12  $\times$  17 = 2.04

---

153 \$13.77

\$13.77  $\div$  153 = \$.09, average  
selling price ;

\$.09  $\div$  1.33  $\frac{1}{3}$  = \$.0675, *Ans.*

(366, 367)

Ex. 6.  $\$2.70 \times 42 = \$113.40$

$2.85 \times 48 = 136.80$

$3.24 \times 65 = 210.60$

---

155  $\$460.80$ , cost;

$\$460.80 \times 1\frac{1}{5} = \$552.96$ , to be sold for;

$\$552.96 \div 155 = \$3.567\frac{1}{3}\frac{5}{11}$ , *Ans.*

Ex. 7. As the degrees and minutes of all the observations are alike, we need to average only the seconds, thus:  
 $25.4'' + 24.5'' + 27.8'' + 26.9'' + 25.4'' + 24.7''$   
 $+ 24.2'' + 26.3'' + 25.8'' + 26.7'' = 257.7''$ ;  
 $257.7'' \div 10 = 25.77''$ . *Ans.*  $36^\circ 17' 25.77''$ .

Ex. 8. Since the third trial is entitled to twice the degree of reliance to be placed upon either of the others, it is equivalent to two trials giving the same result; hence 37 min. 54.16 sec., 1st trial;

37 " 55.56 " 2d "

37 " 54.82 " 3d "

37 " 54.82 " 3d "

---

44 ) 151 min. 39.36 sec.

---

37 min. 54.84 sec. =  $9^\circ 28' 42.6''$ , *Ans.*

(634, page 370.)

Ex. 2.  $10 \left\{ \begin{array}{c|c|c} 5 & \frac{1}{5} & \\ \hline 7 & & \frac{1}{3} \\ \hline 12 & & \frac{1}{2} \\ \hline 13 & \frac{1}{3} & \end{array} \right\} \left\| \begin{array}{c} 3 \\ \hline 2 \\ \hline 5 \end{array} \right\| \left\| \begin{array}{c} 3 \\ \hline 2 \\ \hline 3 \\ \hline 5 \end{array} \right\|$  *Ans.* 3 lb. of the first kind, 2 lb. of the second, 3 lb. of the third, and 5 lb. of the fourth.

Ex. 3.  $75 \left\{ \begin{array}{c|c|c} 0 & \frac{1}{75} & \\ \hline 60 & & \frac{1}{15} \\ \hline 90 & & \frac{1}{15} \\ \hline 115 & \frac{1}{40} & \end{array} \right\} \left\| \begin{array}{c} 40 \\ \hline 15 \\ \hline 15 \\ \hline 75 \end{array} \right\| \left\| \begin{array}{c} 8 \\ \hline 3 \\ \hline 3 \\ \hline 15 \end{array} \right\|$  *Ans.* 8 gal. of water to 3 gal. at \$.60, 3 gal. at \$.90, and 15 gal. at \$1.15.

(367—370)

Ex. 4.

$$62\frac{1}{2} \left\{ \begin{array}{c|c|c|c|c|c|c|c|c} 40 & \frac{1}{22\frac{1}{2}} & & 17\frac{1}{2} & & 17\frac{1}{2} & 35 & 7 \\ & & 1 & & 17\frac{1}{2} & 17\frac{1}{2} & 35 & 7 \\ & & \frac{2\frac{1}{2}}{1} & & & & & \\ 60 & & & & & & & \\ & \frac{1}{17\frac{1}{2}} & & 22\frac{1}{2} & 2\frac{1}{2} & 25 & 50 & 10 \\ & & 17\frac{1}{2} & & & & & \end{array} \right.$$

Ans. 7 A. from each of the first two tracts, and 10 A. from the other.

Ex. 5.

$$45 \left\{ \begin{array}{c|c|c|c|c|c|c|c|c} 60 & \frac{1}{15} & & 15 & & 15 & 3 \\ 50 & & \frac{1}{5} & & 7 & 3 & 10 & 2 \\ 42 & & & \frac{1}{5} \frac{1}{3} & & 5 & 5 & 1 \\ 38 & & \frac{1}{7} & & 5 & & 5 & 1 \\ 30 & \frac{1}{15} & & 15 & & & 15 & 3 \end{array} \right.$$

Ans. 3 pt. of the first kind, 2 pt. of the second, 1 pt. of the third, 1 pt. of the fourth and 3 pt. of fifth.

*Another Solution*

$$45 \left\{ \begin{array}{c|c|c|c|c|c|c|c|c} 60 & \frac{1}{15} & & 1 & & 1 & & \\ 50 & & \frac{1}{5} & \frac{1}{5} & 7 & 1 & 8 & \\ 42 & \frac{1}{3} & & 5 & & & 5 & \\ 38 & & \frac{1}{7} & & 5 & & 5 & \\ 30 & & & \frac{1}{15} & & 3 & 3 & \end{array} \right.$$

Ans. 1 pt. of first kind, 8 pt. of second, 5 pt. of third, 5 pt. of fourth and 3 pt. of fifth.

Ex. 6.

$$\frac{7}{8} \left\{ \begin{array}{c|c|c|c|c|c|c|c} \frac{3}{4} & 8 & 24 & 24 & 3 & & & \\ \frac{5}{6} & & 24 & 24 & 3 & & & \\ \frac{9}{10} & 40 & 40 & 120 & 160 & 20 & & \end{array} \right. \begin{array}{l} \text{Ans. 3 lb. at } \frac{3}{4} \\ \text{pure, 3 lb. at } \frac{5}{6} \\ \text{pure, 20 lb. } \frac{9}{10}. \end{array}$$

NOTE.—In the above solution, we multiply the first ratio, 8 : 40, by 3, making 24 : 120. Then by adding, we get 24 : 24 : 160, which reduced gives 3 : 3 : 20.

(635, page 371.)

Ex. 1. 
$$58 \left\{ \begin{array}{c|c|c|c|c|c|c} 25 & \frac{1}{33} & & 12 & & 4 & 4 \\ 50 & & \frac{1}{8} & & 4 & & 4 \\ 62 & & \frac{1}{4} & & 8 & & 8 \\ 70 & \frac{1}{12} & & 33 & & 11 & 11 \end{array} \right. \begin{array}{l} \text{NOTE.—Divide the} \\ \text{terms in the 3d col-} \\ \text{umn by 3, and to} \\ \text{the result add the} \\ \text{terms in the 4th.} \end{array}$$

Ans. 4 gal. of the first two kinds, 8 gal. of the third, and 11 gal. of the fourth.

Ex. 2. 
$$10 \left\{ \begin{array}{c|c|c|c|c|c|c} 7 & \frac{1}{3} & & 1 & & 5 & 5 \\ 8 & & \frac{1}{2} & & 5 & & 5 \\ 13 & \frac{1}{3} & & 1 & & 5 & 5 \\ 15 & & \frac{1}{5} & & 2 & & 2 \end{array} \right. \begin{array}{l} \text{NOTE.—Multiply the} \\ \text{terms in the third col-} \\ \text{umn by 5, and add the} \\ \text{result to the terms in the} \\ \text{fourth column.} \end{array}$$

Ans. 5, 5, 5, and 2.

Ex. 3. *For the first mixture.*

$$70 \left\{ \begin{array}{c|c|c|c|c|c|c} 30 & \frac{1}{40} & & 3 & & 3 & 1 \\ 50 & & \frac{1}{20} & & 3 & & 1 \\ 100 & \frac{1}{30} & \frac{1}{30} & 4 & 2 & 6 & 2 \end{array} \right. \text{Ans. 1, 1, and 2.}$$

*For the second mixture.*

$$70 \left\{ \begin{array}{c|c|c|c|c|c|c} 30 & \frac{1}{40} & & 3 & & 3 & 1 \\ 50 & & \frac{1}{20} & & 3 & 12 & 12 \\ 100 & \frac{1}{30} & \frac{1}{30} & 4 & 2 & 8 & 12 \end{array} \right. \begin{array}{l} \text{Ans.} \\ 1, 4 \text{ and } 4. \end{array}$$

NOTE.—Multiply the terms in the fourth column by 4, and to the result add the terms in the third column, and then divide by 3.

(636, page 372.)

Ex. 1. 
$$22 \left\{ \begin{array}{c|c|c|c|c|c|c} 16 & \frac{1}{6} & & 1 & & 1 & 10 \\ 18 & & \frac{1}{4} & & 1 & & 10 \\ 20 & & & \frac{1}{2} & & 1 & 10 \\ 24 & \frac{1}{2} & \frac{1}{2} & \frac{1}{2} & 3 & 2 & 1 \end{array} \right. \begin{array}{l} \text{Ans. 10 at} \\ \$16, 10 \text{ at } \$18 \\ \text{and } 60 \text{ at } \$24. \end{array}$$

Ex. 2.  $\$15 \div 12 = \$1\frac{1}{4}$ , price per yard of the ingredient whose quantity is limited.

$$1\frac{1}{2} \left\{ \begin{array}{c|c|c|c|c|c|c} \frac{3}{4} & \frac{20}{9} & \frac{20}{9} & 1 & 11 & 12 & 4 \\ 1\frac{1}{4} & 20 & & 9 & & 9 & 3 \\ 1\frac{3}{4} & & \frac{20}{11} & & 9 & 9 & 3 \end{array} \right. \begin{array}{l} \text{Ans. 16 yd.} \\ \text{at } \$\frac{3}{4}, \text{ and } 12 \\ \text{yd. } \$1\frac{3}{4}. \end{array}$$

(371, 372)

Ex. 3. 9 gal. 2 qt. 1 pt. = 77 pt.

$$84 \left\{ \begin{array}{c|c|c|c} 0 & \frac{1}{84} & 1 & 11 \\ \hline 96 & \frac{1}{12} & 7 & 77 \end{array} \right. \text{Ans. 11 pt.} = 1 \text{ gal. 1 qt. 1 pt.}$$

$$\text{Ex. 4. } 45 \left\{ \begin{array}{c|c|c|c|c|c|c|c|c} 30 & \frac{1}{15} & \frac{1}{15} & 2 & 5 & 10 & 15 & 60 \\ \hline 55 & \frac{1}{10} & & 3 & & 15 & 15 & 60 \\ \hline 70 & & \frac{1}{25} & & 3 & & 3 & 12 \end{array} \right. \text{Ans. 60 lb.}$$

(637, page 373.)

Ex. 1.  $\$2.20 \times 7 = \$15.40$

$\$2.00 \times 7 = 14.00$

$$\begin{array}{r} 14 ) \$29.40 \\ \hline \end{array}$$

$\$2.10$ , average price of the 14 yd.

$$180 \left\{ \begin{array}{c|c|c|c|c|c|c|c|c} 160 & \frac{1}{20} & & 3 & 3 & 1 & 14 \\ \hline 175 & & \frac{1}{5} & 6 & 6 & 2 & 28 \\ \hline 210 & \frac{1}{30} & \frac{1}{30} & 2 & 1 & 3 & 14 \end{array} \right. \begin{array}{l} \text{Ans. 14 yd.} \\ \text{at \$1.60, and} \\ \text{28 yd. \$1.75.} \end{array}$$

Ex. 2.  $\$1.14 \times 60 = \$68.40$

$\$1.26 \times 30 = 37.80$

$$\begin{array}{r} 90 ) \$106.20 \\ \hline \end{array}$$

$\$1.18$ , average price of the 90 gal.

$$157 \left\{ \begin{array}{c|c|c|c} 118 & \frac{1}{39} & 18 & 90 \\ \hline 175 & \frac{1}{18} & 39 & 195 \end{array} \right. \text{Ans. 195 gal.}$$

Ex. 3.  $\$2.00 \times 40 = \$80$

$\$.50 \times 70 = 35$

$$\begin{array}{r} 110 ) \$115 \\ \hline \end{array}$$

$\$1\frac{1}{22}$ , average price of the 110 bu.

$$1 \left\{ \begin{array}{c|c|c|c|c} \frac{1}{22} & \frac{4}{22} & 4 & 2 & 6\frac{2}{3} \\ \hline 1\frac{1}{22} & 22 & 66 & 33 & 110 \end{array} \right. \text{Ans. } 6\frac{2}{3} \text{ bu.}$$

NOTE.—Multiply the terms in the fourth column by  $\frac{110}{33} = 10$ .

(372, 373)



(638, page 374)

Ex. 1. 
$$20 \left\{ \begin{array}{c|c|c|c|c|c|c} 8 & 1\frac{1}{2} & & 1 & 1 & 40 \\ 16 & & \frac{1}{4} & 1 & 1 & 40 \\ 24 & \frac{1}{4} & \frac{1}{4} & 3 & 1 & 4 \\ & & & & 6 & 160 \\ & & & & & \hline & & & & & 240 \end{array} \right. \begin{array}{l} \text{Ans. 40 lb. at 8} \\ \text{cts., 40 lb. at 16} \\ \text{cts., and 160 lb.} \\ \text{at 24 cts.} \end{array}$$

Ex. 2.  $\$154 \div 154 = \$1$ , average price.

1 
$$\left\{ \begin{array}{c|c|c|c|c|c|c} 3\frac{1}{2} & 1 & & 1 & & & \\ & 2\frac{1}{2} & & & & & \\ 11\frac{1}{3} & & 3 & & 1 & 14 \\ \frac{1}{2} & 2 & 2 & 5 & 3 & 42 \\ & & & & 7 & 98 \\ & & & & \hline & & & & 11 & 154 \end{array} \right. \begin{array}{l} \text{Ans. 14 calves, 42} \\ \text{sheep, and 98 lambs.} \end{array}$$

Ex. 3.  $\$165 \div 55 = \$3$ , average weekly wages.

3 
$$\left\{ \begin{array}{c|c|c|c|c|c|c} 5 & \frac{1}{2} & \frac{1}{2} & 5 & 1 & 6 & 30 \\ 1 & & \frac{1}{2} & & 1 & 1 & 5 \\ & 1 & & & & & \\ \frac{1}{2} & \hline & 2\frac{1}{2} & & 4 & & 4 & 20 \\ & & & & & \hline & & & & 11 & 55 \end{array} \right. \begin{array}{l} \text{Ans. 30 men, 5} \\ \text{women, and 20 boys.} \end{array}$$

## INVOLUTION.

(644, page 376.)

Ex. 3. Ans. 2102500

Ex. 13. Ans. 2023.37890625

Ex. 14. Ans. 3838.28125

Ex. 16. Ans. 1871688  $\frac{7}{11}$

(374—376)

## EVOLUTION.

## SQUARE ROOT.

(657, page 381.)

Ex. 3. *Ans.* 7502; 24.4315+.

Ex. 9.  $99225 - 63504 = 35721$ ;  $\sqrt{35721} = 189$ , *Ans.*

Ex. 10.  $\sqrt{.126736} = .356$ ;  $\sqrt{.045369} = .213$ ;  
 $.356 - .213 = .143$ , *Ans.*

Ex. 11.  $\sqrt{\frac{169}{196}} = \frac{\sqrt{169}}{\sqrt{196}} = \frac{13}{14}$ ;  $\sqrt{\frac{7056}{9216}} = \frac{\sqrt{7056}}{\sqrt{9216}} = \frac{84}{96}$ ;  
 $\frac{13}{14} \times \frac{84}{96} = \frac{13}{16}$ , *Ans.*

Ex. 12.  $\sqrt{81^2 \times 625^2 \times 2^4} = 81 \times 625 \times 2^2 = 202500$ , *Ans.*

## CONTRACTED METHOD.

(658, page 382.)

Ex. 1.	$\overline{)5.6568542+}$ , <i>Ans.</i>	Ex. 2.	$\overline{)3.4641016+}$ , <i>Ans.</i>
	32.000000		12.000000
	25		9
	<hr/>		<hr/>
106	7.00	64	300
	636		256
	<hr/>		<hr/>
1125	6400	686	4440
	5625		4116
	<hr/>		<hr/>
11306	77500	6924	28400
	67836		27696
	<hr/>		<hr/>

11312	9664	6928	704
	9050		693

1131	614	693	11
	566		7

113	48	7	4
	45		4

11	3
	2

Ex. 3.  $\sqrt{57.3322} +$ , *Ans.*  
 3286.9835  
 25

107	786
	749

1143	3798
	3429

1146	369
	344

115	25
	23

12	2
	2

Ex. 4.  $\sqrt{.745355} +$ , *Ans.*  
 $.5 = .555555 +$   
 49

144	655
	576

1485	7955
	7425

1490	530
	447

149	83
	75

15	8
	8

Ex. 5.  $\sqrt{2.563479} +$ , *Ans.*  
 $6\frac{4}{7} = 6.571428 +$   
 4

45	257
	225

Ex. 6.  $\sqrt{1.156817} +$ , *Ans.*  
 $1.06^5 = 1.338226 \pm$   
 1

21	33
	21

506	3214
	3036
5123	17828
	15369
5126	2459
	2050
513	409
	359
51	50
	46

Ex. 7.  $1.0125^3 = 1.0380 +$   
 $\frac{1.0188}{1}, \text{Ans.}$   
 $\frac{1.0380}{1} +$   
 $\frac{1}{1}$

201    380  
       201

202    179  
       162

20    17  
       16

225	1282
	1125
2306	15726
	13836
2312	1890
	1850
231	40
	23
23	17
	16

Ex. 8.  $|1.011620 \pm, \text{Ans.}$   
 $\frac{1.023375}{1}$   
 $\frac{1}{1}$

201    0233  
       201

2021    3275  
       2021

2022    1254  
       1213

202    41  
       40

20    1

## CUBE ROOT.

(661, page 388.)

Ex. 9.  $\sqrt[3]{134217728} = 512; \sqrt[3]{512} = 8, \text{Ans.}$

Ex. 10.  $39304^2 = 1544804416; \sqrt[3]{1544804416} = 1156, \text{Ans.}$

(383—388)

Ex. 11.  $\sqrt[3]{\frac{648}{3000}} = \sqrt[3]{\frac{216}{125}} = \frac{6}{5}$ ;  $\sqrt[3]{\frac{1331}{3179}} = \sqrt[3]{\frac{121}{289}} = \frac{11}{17}$ ;  
 $\frac{6}{5} \times \frac{11}{17} = \frac{66}{85}$ , Ans.

Ex. 12.  $\sqrt[3]{50} = 3.6840 +$   
 $\sqrt[3]{31} = 3.1413 +$   


---

 $6.8253 +$ , sum of cube roots;  
 $\sqrt[3]{50 + 31} = \sqrt[3]{81} = 4.3267 +$ , cube root of sum;  


---

 $2.4986 +$ , Ans.

## CONTRACTED METHOD.

(622, page 390.)

Ex. 1.		$\sqrt[3]{2.8844992 \pm}$ , Ans.	
		24.000000	
		8	
		<hr/>	
68	544	1200	16000
		1744	13952
<hr/>		<hr/>	
848	6784	235200	2048000
		241984	1935872
<hr/>		<hr/>	
864	346	248832	112128
		249178	99671
<hr/>		<hr/>	
9	4	24952	12457
		24956	9982
<hr/>		<hr/>	
		2496	2475
			2246
<hr/>		<hr/>	
		250	229
			225
<hr/>		<hr/>	
		25	4
			5

(388—390)



Ex. 2.

*Ans.*,  $\overline{122.894801334 \pm}$ .

		12000.812161	
		8	
62	124	1200	4000
		1324	2648
668	5344	145200	1352812
		150544	1204352
6849	61641	15595200	148460161
		15656841	140911569
6867	2747	15718563	7548592
		15721310	6288524
69	55	1572406	1260068
		1572461	1257969
		157252	2099
			1573
		1573	526
			472
		157	54
			47
		16	7
			6

Ex. 3.

 $\overline{.555554730 \pm}$ , *Ans.*

		.171467000	
		125	
155	775	7500	46167
		8275	41375
1655	8275	907500	5092000
		915775	4578875

		924075	513125
1665	833	924908	462454
<hr/>			
		92574	50671
17	9	92583	46292
<hr/>			
		9259	4379
			3704
<hr/>			
		926	675
			648
<hr/>			
		93	27
			27
<hr/>			
		9	0

Ex. 4.

1.34442±, Ans.

2.429990

1

		300	1429
33	99	399	1197
<hr/>			
		50700	232990
394	1576	52276	209104
<hr/>			
		53868	23886
402	161	54029	21612
<hr/>			
		5419	2274
4	2	5421	2168
<hr/>			
		542	106
			108

Ex. 5.

2.6888±, Ans.

19.440

8

		1200	11440
66	396	1596	9576

(390)

78	60	2028	1864
		2088	1670
1	1	215	194
		216	173
		22	21
			18
		2	3

Ex. 6.

.941035±, Ans.

$$\frac{5}{8} = \frac{.833333}{729}$$

274	1096	24300	104333
		25396	101584
282	28	26508	2749
		26536	2654
		2656	95
			80
		27	15
			14

Ex. 7.

.829826686±, Ana.

$$\frac{.571428888}{512}$$

242	484	19200	59428
		19684	39368
2469	22221	2017200	20060888
		2039421	18354789
2487	1990	2061723	1706099
		2063713	1650970
25	5	206570	55129
		206575	41315

20658	13814
	12395
2066	1419
	1240
207	179
	166
21	13
	13

**Ex. 8.**

$$1.08674325^2 = \frac{1.057023 \pm, \text{Ans.}}{1.181011 \pm}$$

305	1525	30000	181011
		31525	157625
315	221	33075	23386
		33296	23307
		3352	79
			67
		34	12
			10

**Ex. 9.**

$$1.05^5 = \frac{1.084715 \pm, \text{Ans.}}{1.276282}$$

308	2464	30000	276282
		32464	259712
324	130	34992	16570
		35122	14049
3	2	3525	2521
		3527	2469
		353	52
			35
		35	17
			18

## ROOTS OF ANY DEGREE.

(664, page 391.)

Ex. 1.  $6=3 \times 2$ ;  $\sqrt[3]{6321363049}=1849$ ;  $\sqrt{1849}=43$ , *Ans.*

Ex. 2.  $4=2 \times 2$ ;  $\sqrt{5636405776}=75076$ ;  
 $\sqrt{75076}=274$ , *Ans.*

Ex. 3.  $8=2 \times 2 \times 2$ ;  $\sqrt{1099511627776}=1048576$ ;  
 $\sqrt{1048576}=1024$ ;  $\sqrt{1024}=32$ , *Ans.*

Ex. 4.  $6=3 \times 2$ ;  $\sqrt{25632972850442049}=160103007$ ;  
 $\sqrt[3]{160103007}=543$ , *Ans.*

Ex. 5.  $9=3 \times 3$ ;  $\sqrt[3]{1.577635}=1.164132+$ ;  
 $\sqrt{1.164132}=1.051963+$ , *Ans.*

Ex. 6.  $12=2 \times 2 \times 3$ ;  $\sqrt[3]{16.3939}=2.5404+$ ;  
 $\sqrt{2.5404}=1.5938+$ ;  $\sqrt{1.5938}=1.2624+$ , *Ans.*

Ex. 7.  $18=2 \times 3 \times 3$ ;  $\sqrt{104.9617}=10.24508+$ ;  
 $\sqrt[3]{10.24508}=2.171893+$ ;  
 $\sqrt[3]{2.171893}=1.2950+$ , *Ans.*

(665, page 393.)

Ex 2.  $\sqrt[4]{120}=3.31+$ ;  $\sqrt[5]{120}=2.22+$ ;  
 $3.31+2.22=5.53$ ;  $5.53 \div 2=2.76$ , assumed root;  


---

 $2.76^4=58.06+$ ;  $120 \div 58.06=2.0669+$ ;  
 $2.76 \times 4+2.0669=13.1069$ ;  
 $13.1069 \div 5=2.6214$ , 1st approximation.  


---

 $2.6214^4=47.2203+$ ;  $120 \div 47.2203=2.54128+$ ;  
 $2.6214 \times 4+2.54128=13.02688$ ;  
 $13.02688 \div 5=2.60537$ , 2d approximation.  


---

 $2.60537^4=46.07627+$ ;  $120 \div 46.07627=$



$2.604378+; 2.60537 \times 4 + 2.604378 = 13.025858;$   
 $13.025858 \div 5 = 2.605171$ , 3d approximation, which  
 is correct to the last decimal place.

**Ex. 3.**  $\sqrt[5]{1.95678} = 1.11838+; \sqrt[5]{1.95678} = 1.08292+;$   
 $1.11838 + 1.08292 = 2.20130;$   
 $2.20130 \div 2 = 1.10065$ , assumed root;  


---

 $1.10065^6 = 1.77785129+; 1.95678 \div 1.77785129 =$   
 $1.10064324+; 1.10065 \times 6 + 1.10064324 =$   
 $7.70454324; 7.70454324 \div 7 = 1.10064903$ , 1st ap-  
 proximation, correct to the last decimal place.

**Ex. 4.**  $10 = 2 \times 5; \sqrt[5]{743044} = 862.$   
 Take 4 = the assumed 5th root of 862; then  
 $4^4 = 256; 862 \div 256 = 3.36; 4 \times 4 + 3.36 = 19.36;$   
 $19.36 \div 5 = 3.872$ , 1st approximation.  


---

 $3.872^4 = 224.771579; 862 \div 224.771579 =$   
 $3.83500443+; 3.872 \times 4 + 3.83500443 =$   
 $19.32300443; 19.32300443 \div 5 = 3.8646008$ , 2d  
 approximation, *Ans.*

**Ex. 5.**  $15 = 3 \times 5; \sqrt[5]{15} = 2.466212+.$   
 Take 1.2 = the assumed 5th root of 2.466212; then  
 $1.2^4 = 2.0736; 2.466212 \div 2.0736 = 1.189339+;$   
 $1.2 \times 4 + 1.189339 = 5.989339;$   
 $5.989339 \div 5 = 1.197868$ , 1st approximation.  


---

 $1.197868^4 = 2.058898+; 2.466212 \div 2.058898 =$   
 $1.197831+; 1.197868 \times 4 + 1.197831 = 5.989303;$   
 $5.989303 \div 5 = 1.197861$ , 2d approximation, correct  
 to the last place; hence *Ans.*, 1.197861+.

**Ex. 6.** Since  $25 = 5 \times 5$ , we might extract the 5th root of  
 the 5th root, for the 25th root. A more convenient  
 method is as follows:

$$\sqrt{100}=10;$$

$$\sqrt[4]{100}=\sqrt{\sqrt{10}}=3.1622+;$$

$$\sqrt[8]{100}=\sqrt{\sqrt{3.1622}}=1.7782+;$$

$$\sqrt[16]{100}=\sqrt[4]{1.7782}=1.2115+.$$

Now, as the 25th root must be less than the 24th root, take  $1.2$  = the assumed root.

$$1.2^{24}=79.49684+; 100 \div 79.49684=1.25792+;$$

$$1.2 \times 24 + 1.25792 = 30.05792;$$

$$30.05792 \div 25 = 1.2023168, \text{ 1st approximation.}$$

$$1.2023168^{24}=83.2677184+; 100 \div 83.2677184=$$

$$1.2009492+; 1.2023168 \times 24 + 1.2009492 =$$

$$30.0565524; 30.0565524 \div 25 = 1.202262+,$$

*Ans.*, correct to 5 decimal places.

**Ex. 7.**  $\sqrt[4]{5}=1.5+; \sqrt[6]{5}=1.3+; 1.5+1.3=2.8;$

$$2.8 \div 2 = 1.4, \text{ assumed root}$$

$$1.4^4=3.8416; 5 \div 3.8416=1.3016+; 1.4 \times 4 +$$

$$1.3016=6.9016;$$

$$6.9016 \div 5 = 1.38032, \text{ 1st approximation.}$$

$$1.38032^4=3.63011+; 5 \div 3.63011=1.37721+;$$

$$1.38032 \times 4 + 1.37721 = 6.89849;$$

$$6.89849 \div 5 = 1.37970+, \text{ Ans.}$$

#### APPLICATIONS OF SQUARE AND CUBE ROOT.

(689, page 396.)

**Ex. 1.**  $256^2=65536$ , square of hypotenuse;

$75^2=5625$ , “ “ altitude;

$59911$ , square of base;

(393—396)

$$\sqrt{59911}=244.76+, \text{ base;} \\ 244.76 \text{ ft.} - 22 \text{ ft.} = 222.76 \text{ ft., } \textit{Ans.}$$

Ex. 2.  $\sqrt{84^2+50^2}=97.75+ \text{ lea.} = 337.23+ \text{ mi., } \textit{Ans.}$

Ex. 3.  $\sqrt{50^2-30^2}=40 \text{ ft. from foot ladder to one side;} \\ \sqrt{50^2-40^2}=30 \text{ " " " " the other " } \\ 40 \text{ ft.} + 30 \text{ ft.} = 70 \text{ ft., } \textit{Ans.}$

Ex. 4.  $\sqrt{6^2+6^2}=\text{diagonal of one side; and since this di-}$   
agonal and the adjacent edge form a right-angled  
triangle whose hypotenuse is the required diagonal,  
we have  $\sqrt{6^2+6^2+6^2}=\sqrt{108}=10.39+ \text{ ft., } \textit{Ans.}$

(690, page 397.)

Ex. 1.  $208 \times 13 = 2704; \sqrt{2704} = 52 \text{ rods, } \textit{Ans.}$

Ex. 2.  $(216+24) \times 2 = 480 \text{ rd. of fence to inclose the farm in}$   
rectangular form.  $\$312 \div 480 = \$.65, \text{ price per rd.;} \\ 216 \times 24 = 5184; \sqrt{5184} = 72 \text{ rods, in one side of}$   
square farm of same area; hence  $\$.65 \times 72 \times 4 =$   
 $\$187.20, \text{ cost of fence for square farm;} \\ \$312 - \$187.20 = \$124.80, \textit{Ans.}$

Ex. 3.  $\sqrt{588 \times 12} = 84, \textit{Ans.}$

Ex. 4. If A receives  $\frac{1}{3}$  of the gain, B receives the other  $\frac{2}{3}$ ;  
consequently B's product must be 2 times A's prod-  
uct. Hence,  $540 \times 480 \times 2 = 518400$ , B's product,  
which is the square of B's capital. Therefore,  
 $\sqrt{518400} \div \$720, \textit{Ans.}$

(691, page 398.)

Ex. 1.  $4 \times 3 = 12; 432 \div 12 = 36; \sqrt{36} = 6;$   
 $4 \times 6 = 24 \text{ ft., length;} 3 \times 6 = 18 \text{ ft., breadth, } \textit{Ans.}$

Ex. 2.  $2 \times 3 = 6; 23 \div 6 = 3.833333+;$   
 $\sqrt{3.833333} = 1.95789+;$   
 $2 \times 1.95789 = 3.91578+; \}$   
 $3 \times 1.95789 = 5.87367+; \} \textit{Ans.}$

(396-398)

- Ex. 3.  $283\text{A. } 2\text{R. } 27\text{P.}=45387\text{P.}; 1 \times 3=3; 45387 \div 3=15129; \sqrt{15129}=123;$   
 $1 \times 123=123 \text{ rods, width; } \left. \begin{array}{l} 3 \times 123=369 \text{ rods, length; } \end{array} \right\} \text{Ans.}$

(692, page 399.)

- Ex. 2.  $1 : 5=75^2 : (?) = 28125$ , the square of the cost;  
 hence  $\sqrt{28125}=\$167.70+$ , *Ans.*
- Ex. 3.  $80 : 1200=6^2 : (?) = 540$ , square of the diameter required;  
 $\sqrt{540}=23.23+$  ft., *Ans.*
- Ex. 4.  $5\text{h.}=18000 \text{ sec.}; 55 \text{ min. } 6 \text{ sec.}=3306 \text{ sec.}$  Since the greater the diameter of the pipe, the less the time, the times will be inversely as the squares of the diameters. Hence  
 $3306 : 18000=1.5^2 : (?) = 12.25+$  in.  
 $\sqrt{12.25}=3.5 \text{ in. nearly, } \text{Ans.}$

(693, page 399.)

- Ex. 1.  $24 \times 18 \times 4=1728 \text{ cu. ft., contents; } \sqrt[3]{1728}=12 \text{ ft., } \text{Ans.}$
- Ex. 2.  $2150.4 \text{ cu. in.} \times 150=322560 \text{ cu. in. in the bin; } \sqrt[3]{322560}=68.6 \text{ in.}=5 \text{ ft. } 8.6 \text{ in., } \text{Ans.}$
- Ex. 3.  $231 \text{ cu in.} \times 31.5 \times 200=1455300 \text{ cu.in.in the cistern; } \sqrt[3]{1455300}=113.3 \text{ in.}=9 \text{ ft. } 5.3 \text{ in., } \text{Ans.}$
- Ex. 4.  $\sqrt[3]{79507}=43 \text{ ft., length of one side; } 43^2 \times 6=11094., \text{Ans.}$

(694, page 400.)

- Ex. 1.  $2 \times 3 \times 4=24; 3000 \div 24=125; \sqrt[3]{125}=5;$   
 $2 \times 5=10; 3 \times 5=15; \text{ and } 4 \times 5=20.$
- Ex. 2.  $2 \times 5 \times 7=70; 4480 \div 70=64; \sqrt[3]{64}=4;$   
 $2 \times 4=8; 5 \times 4=20; 7 \times 4=28.$

(398—400)

**Ex. 3.**  $2 \times 2\frac{1}{2} \times 3 = 15$  ;  $100 \div 15 = 6.66666+$  ;  
 $\sqrt[3]{6.66666} = 1.882072+$  ;

$$\left. \begin{array}{l} 2 \times 1.882072 = 3.76414+ ; \\ 2\frac{1}{2} \times 1.882072 = 4.70518+ ; \\ 3 \times 1.882072 = 5.64622- ; \end{array} \right\} \text{Ans.}$$

**Ex. 4.**  $2150.4 \text{ cu. in.} \times 450 = 967680 \text{ cu. in., contents}$  ;  
 $1 \times 1 \times 3 = 3$ , product of proportional terms ;  
 $967680 \div 3 = 322560$  ;  
 $\sqrt[3]{322560} = 68.6 \text{ in.} = 5 \text{ ft. } 8.6 \text{ in., width and depth}$  ;  
 $68.6 \text{ in.} \times 3 = 205.8 \text{ in.} = 17 \text{ ft. } 1.8 \text{ in., length}$ .

PROMISCUOUS EXAMPLES.

(Page 401.)

**Ex. 1.**  $10\text{A. } 2\text{R. } 20\text{P.} = 1700 \text{ sq. rd.}$  ;  
 $3 \times 4 = 12$ , product of proportional terms ;  
 $1700 \div 12 = 141.66+$  ;  $\sqrt{141.66} = 11.9+$  ;

$3 \times 11.9 = 35.7 \text{ rd., breadth}$  ;

$4 \times 11.9 = 47.6 \text{ rd., length}$  ,

$35.7^2 = 1274.49$

$47.6^2 = 2265.76$

$3540.25$ , sum of squares of the two sides ;

$\sqrt{3540.25} = 59.5 \text{ rd., length of the diagonal}$  ;

$35.7 \text{ rd.} + 47.6 \text{ rd.} = 83.3 \text{ rd., distance by the walk}$  ;

$83.3 \text{ rd.} - 59.5 \text{ rd.} = 23.8 \text{ rd., excess}$  ;

$3 \text{ mi.} \times 320 = 960 \text{ rd.}$  ;  $960 \div 60 = 16 \text{ rd., rate per min.}$  ;

$23.8 \div 16 = 1.4875 \text{ min.} = 1 \text{ min. } 29.3 \text{ sec., Ans.}$

**Ex. 2.**  $40 \text{ A.} = 6400 \text{ sq. rd.}$  ;  $\sqrt{6400} = 80 \text{ rd., Ans.}$

**Ex. 3.** The dimensions of the lots are as  $100 : 144$ , or as  $25 : 36$ . Now, if the lots were  $25 \text{ ft.}$  deep and  $36 \text{ ft.}$  front, the area of each would be  $25 \times 36 = 900 \text{ sq. ft.}$  ; and a square lot of the same area must be  $\sqrt{900}$

(400, 401)



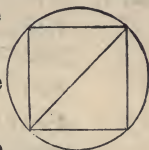
=30 ft. on a side. That is, the streets must be 30 ft.  
 —25 ft.=5 ft. farther apart. Hence  
 5 ft. : 25 ft.=20 ft. : (?) =100 ft., *Ans.*

**Ex. 4** 40 A.=6400 sq. rd;  
 $\sqrt{6400}=80$  rd., one side of the square;  
 $\$1.40 \times 80 \times 4 = \$448$ , cost of fencing the square;  
 $6400 \times \frac{1}{4} = 1600$ ;  $\sqrt{1600}=40$ , breadth of rectangle;  
 $40 \times 4 = 160$ , length of “  
 $(160+40) \times 2 = 400$  rd., distance round “  
 $\$1.40 \times 400 = \$560$ , cost of fencing “  
 $\$560 - \$448 = \$112$ , *Ans.*

**Ex. 5.**  $6^2 : 18^2 = 80$  bbl.; (?) =720 bbl., *Ans.*

**Ex. 6.**  $5\frac{1}{2} \times 7 = 38.5$  sq. ft., area of rectangle;  
 $\sqrt{38.5} = 6.20 +$  ft. =6 ft. 2.4 + in., *Ans.*

**Ex. 7.** The diameter of the circle will be the  
 diagonal of the square. Hence  $42^2$   
 $=1764$ , twice the square of one side  
 of the inclosed square.  
 $1764 \div 2 = 884$ , the square of one side  
 of the inclosed square;  $\sqrt{884} = 29.7$ —in., *Ans.*



**Ex. 8.** 3 A. 86 P.=566 P.; 17 A. 110 P.=2830 P.;  
 $566 : 2830 = 75^2 : (?) = 28125$ , the square of the re-  
 quired cost;  $\sqrt{28125} = \$167.70$ , *Ans.*

**Ex. 9.**  $6 \text{ ft.} \times \sqrt[3]{\frac{1}{8}} = 6 \text{ ft.} \times \frac{1}{2} = 3 \text{ ft.}$ , *Ans.*

**Ex. 10**  $12^3 \div 4^3 = 1728 \div 64 = 27$ , *Ans.*

**Ex. 11**  $\frac{8}{6.5} = \frac{80}{65} = \frac{16}{13}$ ;  $900 \times \frac{16^3}{13^3} = 1677 \text{ lb. } 14 + \text{ oz.}$ , *Ans.*

**Ex. 12.**  $\sqrt[3]{\frac{4960}{2500}} = \sqrt[3]{\frac{248}{125}} = \frac{6.28}{5} = 1.256 +$ ;  
 $3 \text{ in.} \times 1.256 = 3.77$ — in., *Ans.*

**Ex. 13.**  $\sqrt[3]{\frac{20}{4}} = \sqrt[3]{5} = 1.71 +$ ;  $4 \text{ ft.} \times 1.71 = 6.84 \text{ ft.}$ , *Ans.*

## SERIES.

## GENERAL PROBLEMS IN ARITHMETICAL PROGRESSION.

(706, page 404.)

- Ex. 1.  $(8-1) \times 4 = 28$ ;  $28+5=33$ , *Ans.*  
 Ex. 2.  $(50-1) \times 3 = 147$ ;  $147+2=149$ , *Ans.*  
 Ex. 3.  $(13-1) + 7 = 84$ ;  $100-84=16$ , *Ans.*  
 Ex. 4.  $(20-1) \times \frac{3}{8} = 7\frac{1}{8}$ ;  $7\frac{1}{8} + \frac{2}{3} = 7\frac{19}{24}$ , *Ans.*

(707, page 405.)

- Ex. 1.  $(15-3) \div (7-1) = 2$ , *Ans.*  
 Ex. 2.  $(51-1) \div (76-1) = \frac{2}{3}$ , *Ans.*  
 Ex. 3.  $.1-.05=.05$ ;  $8-1=7$ ;  $.05 \div 7 = .00714285$ , *Ans.*  
 Ex. 4.  $2\frac{1}{2} \div 17 = \frac{5}{34}$ , *Ans.*

(708, page 405.)

- Ex. 1.  $75-5=70$ ;  $70 \div 5=14$ ;  $14+1=15$ , *Ans.*  
 Ex. 2.  $20-\frac{1}{2}=19\frac{1}{2}$ ;  $19\frac{1}{2} \div 6\frac{1}{2}=3$ ;  $3+1=4$ , *Ans.*  
 Ex. 3.  $2.5-.25=2.25$ ;  $2.25 \div .125=18$ ;  $18+1=19$ , *Ans.*  
 Ex. 4. If there are 5 means, there will be  $5+2=7$  terms.  
 Hence  $37-2=35$ ;  $35 \div 6 = 5\frac{5}{6}$ , common difference.  
*Ans.* 2,  $7\frac{5}{6}$ ,  $13\frac{2}{3}$ ,  $19\frac{1}{2}$ ,  $25\frac{1}{3}$ ,  $31\frac{1}{6}$ , 37.

(709, page 406.)

- Ex. 1.  $40-4=36$ ;  $36 \div 6=6$ ;  $6+1=7$ , number of terms;  
 $(40+4) \times \frac{7}{2} = 154$ , *Ans.*  
 Ex. 2.  $250 \times \frac{1000}{2} = 125000$ , *Ans.*  
 Ex. 3. 11=No. terms; 220=last term; 17=com. diff.;  
 $(11-1) \times 17 = 170$ ;  $\$220 - \$170 = \$50$ , first term;  
 $(\$220 + \$50) \times \frac{1}{2} = \$1485$ .

(404-406)

## GENERAL PROBLEMS IN GEOMETRICAL PROGRESSION.

(711, page 407.)

Ex. 1.  $6 \times 4^5 = 6144$ , *Ans.* Ex. 2.  $192 \div 2^6 = 3$ , *Ans.*

Ex. 3.  $6 \times \frac{1}{3^7} = \frac{2}{3^6} = \frac{2}{729}$ , *Ans.*

Ex. 4.  $25 \times \frac{1}{5^4} = \frac{25}{5^4} = \frac{5^2}{5^4} = \frac{1}{25}$ , *Ans.*

(712, page 408.)

Ex. 1.  $512 \div 2 = 256$ ;  $\sqrt[4]{256} = 4$ , *Ans.*

Ex. 2.  $45 \frac{9}{16} \div \frac{1}{48} = 2187$ ;  $\sqrt[3]{2187} = 13.5$ , *Ans.*

Ex. 3.  $7 \div .0112 = 625$ ;  $\sqrt[4]{625} = 5$ , *Ans.*

Ex. 4.  $5000 \div 8 = 625$ ;  $\sqrt[4]{625} = 5$ , ratio;  
*Ans.* 8, 40, 200, 1000, 5000.

(713, page 408.)

Ex. 1.  $1458 \div 2 = 729$

$$\begin{array}{r|l} 3 & 729 \\ \hline 3 & 243 \\ \hline 3 & 81 \\ \hline 3 & 27 \\ \hline 3 & 9 \\ \hline 3 & 3 \\ \hline & 1 \end{array}$$

1 *Ans* 7.

Ex. 2.  $100 \div .1 = 1000$

$$\begin{array}{r|l} 10 & 1000 \\ \hline 10 & 100 \\ \hline 10 & 10 \\ \hline & 1 \end{array}$$

1 *Ans.* 4.

(407. 408)

Ex. 3.  $\frac{1}{5} \div \frac{1}{640} = 128$

$$\begin{array}{r}
 2 \overline{) 128} \\
 \underline{2 \phantom{00}} \\
 2 \phantom{00} \overline{) 64} \\
 \underline{2 \phantom{00}} \\
 2 \phantom{00} \overline{) 32} \\
 \underline{2 \phantom{00}} \\
 2 \phantom{00} \overline{) 16} \\
 \underline{2 \phantom{00}} \\
 2 \phantom{00} \overline{) 8} \\
 \underline{2 \phantom{00}} \\
 2 \phantom{00} \overline{) 4} \\
 \underline{2 \phantom{00}} \\
 2 \phantom{00} \overline{) 2} \\
 \underline{2 \phantom{00}} \\
 1 \text{ Ans. 8.}
 \end{array}$$

Ex. 4.  $196608 \div 6 = 32768$

$$\begin{array}{r}
 8 \overline{) 32768} \\
 \underline{8 \phantom{0000}} \\
 8 \phantom{0000} \overline{) 4096} \\
 \underline{8 \phantom{0000}} \\
 8 \phantom{0000} \overline{) 512} \\
 \underline{8 \phantom{0000}} \\
 8 \phantom{0000} \overline{) 64} \\
 \underline{8 \phantom{0000}} \\
 8 \phantom{0000} \overline{) 8} \\
 \underline{8 \phantom{0000}} \\
 1 \text{ Ans. 6.}
 \end{array}$$

(714, page 409.)

Ex. 1.  $384 \times 2 = 768$ ;  $768 - 3 = 765$ ;  $765 \div 1 = 765$ , Ans.

Ex. 2.  $1080 \times 6 = 6480$ ;  $6480 - 5 = 6475$ ;  
 $6475 \div 5 = 1295$ , Ans.

Ex. 3.  $4\frac{4}{5} \times 3 = 14\frac{2}{5}$ ;  $14\frac{2}{5} - \frac{8}{405} = 14\frac{154}{405}$ ;  
 $14\frac{154}{405} \div 2 = 7\frac{77}{405}$ , Ans.

Ex. 4. The least extreme is 0, and the ratio is  $8 \div 4 = 2$ ;  
 hence,  $8 \times 2 = 16$ , Ans.

(715, page 410.)

Ex. 1.  $3^4 = 81$ ;  $81 - 1 = 80$ ;  $80 \times 7 = 560$ ;  
 $560 \div 2 = 280$ , Ans.

Ex. 2.  $375 \div 5^3 = 3$ , least term;  $5^4 = 625$ ;  $625 - 1 = 624$ ;  
 $624 \times 3 = 1872$ ;  $1872 \div 4 = 468$ , Ans.

Ex. 3.  $1.06^5 = 1.338226 +$ ;  $175 \times .338226 =$   
 $59.189550$ ;  $59.18955 \div .06 = 986.49 +$ , Ans.

(409, 410)

(716, page 410.)

Ex. 1.  $800 - 2 = 798$ ;  $800 - 686 = 114$ ;  $798 \div 114 = 7$ , *Ans.*Ex. 2.  $127\frac{3}{4} - \frac{1}{4} = 127\frac{1}{2}$ ;  $127\frac{3}{4} - 64 = 63\frac{3}{4}$ ;  
 $127\frac{1}{2} \div 63\frac{3}{4} = 2$ , *Ans.*Ex. 3.  $4\frac{1}{2} - 0 = 4\frac{1}{2}$ ;  $4\frac{1}{2} - 3 = 1\frac{1}{2}$ ;  $1\frac{1}{2} \div 4\frac{1}{2} = \frac{1}{3}$ , *Ans.*

## COMPOUND INTEREST BY GEOMETRICAL PROGRESSION.

(718, page 411.)

Ex. 1. \$350 = first term, 5 = number of terms, and  
1.06 = ratio; the last term is required.  
 $\$350 \times 1.06^4 = \$441.86 +$ , *Ans.*Ex. 2. To find the compound interest of \$1, we have \$1 =  
first term, 1.07 = ratio, 3 = No. terms;  
 $\$1 \times 1.07^3 = \$1.1449$ , amount;  
 $\$1.1449 - \$1 = \$.1449$ , int. of \$1;  
 $\$.150 \div .1449 = \$1035.196 +$ , *Ans.*Ex. 3. We have given \$1000 = last term, 1.06 = ratio, 4 =  
No. terms, to find the first term. Reversing the rule,  
 $\$1000 \div 1.06^3 = \$839.62 -$ , *Ans.*Ex. 4. \$40 = first term; \$53.24 = last term; 1.10 = ratio.  
We find the number of terms by Prob. III, thus:  
 $53.24 \div 40 = 1.331$ ;  $1.331 \div 1.10 = 1.21$ ;  $1.21 \div$   
 $1.10 = 1.10$ ;  $1.10 \div 1.10 = 1$ .  
Hence  $3 + 1 = 4 =$  No. terms; and *Ans.*, 3 years.Ex. 5. Let the principal be \$1; then 1 = first term;  
2 = last term; 9 = No. terms. We find the ratio by  
Prob. II, thus:  $2 \div 1 = 2$ ;  $\sqrt[8]{2} = 1.0905 +$ ;  
 $1.0905 - 1 = .0905 = 9.05 + \%$ , *Ans.*



- Ex. 6.**  $\$322.51 =$  last term,  $1.05 =$  ratio,  $25 =$  No. terms.  
We find the first term by Prob. I, thus:  $1.05^{24} =$   
 $3.225100 + ; \$322.51 \div 3.2251 = \$100$ , *Ans.*

## ANNUITIES AT SIMPLE INTEREST

(726, page 414.)

- Ex. 3.**  $\$150 =$  the last term;  $\$150 \times .015 = \$2.25 =$  common difference;  $5\frac{1}{2} \times 4 = 22 =$  No. terms. We find the sum of the series by **706** and **709**, thus:  
 $\$150 + (\$2.25 \times 21) = \$197.25$ , first term;  
 $\$197.25 + \$150$   
 $\frac{\quad}{2} \times 22 = \$3819.75$ , *Ans.*

- Ex. 4.**  $\$500 =$  last term,  $\$3450 =$  sum of series,  $\$500 \times .06 =$   
 $\$30 =$  common difference; we are required to find the number of terms. Now  $3450 \div 500 = 6.9$ ; that is, if the pension did not draw interest, the time required for it to amount to the given sum would be less than 7 yr.; by trial we find the time to be 6 yr.

- Ex. 5.**  $\$6000 =$  last term;  $\$59760 =$  the sum of the series;  $8 =$  No of terms. We find the common difference, thus: according to **709**, 2 times the sum of the series  $=$  the sum of the extremes multiplied by the number of terms. Therefore

$$\frac{\$59760 \times 2}{8} = \$14940, \text{ the sum of the extremes;}$$

$\$14940 - \$6000 = \$8940$ , first term. Hence by **707**,  $\$8940 - \$6000 = \$2940$ ;  $\$2940 \div 7 = \$420$ , common difference. Then  
 $\$420 \div \$6000 = .07 = 7\%$ , *Ans.*

(412—414)

## PROMISCUOUS EXAMPLES IN SERIES.

(729, page 415.)

Ex. 1. Its present amount will be the sum of the geometrical series in which \$200 = first term; 1.06 = ratio, and 20 = No. terms. Hence, by **715**,

$$\frac{200 \times (1.06^{20} - 1)}{1.06 - 1} = \frac{200 \times 2.207135 +}{.06} = \$7357.11 +.$$

Ex. 2. We have given \$16459.35 = sum of the series, 25 = No. of terms, 1.06 = ratio, to find the first term. According to **715**, the sum of the series is equal to  $\frac{1.06^{25} - 1}{1.06 - 1}$ ; the first term multiplied by the fraction  $\frac{1.06^{25} - 1}{1.06 - 1}$ ; consequently the first term will be found by *dividing* the sum of the series by the same fraction; and we have

$$\$16459.35 \times \frac{1.06 - 1}{1.06^{25} - 1} = \frac{\$987.5613}{3.291871} = \$300.$$

Ex. 3. We first find the amount of the annuity in arrears for the 7 years. We have given \$500 = first term, 1.06 = ratio, and 7 = No. terms. Hence by **715**,

$$\frac{\$500 \times (1.06^7 - 1)}{1.06 - 1} = \frac{\$251.815}{.06} = \$4196.91\frac{2}{3}, \text{ sum of}$$

series. We now find, by **553**, what sum will amount to \$4196.91 $\frac{2}{3}$  in 7 years, at 6% compound interest; thus:  $\$4196.91\frac{2}{3} \div 1.503630 = \$2791.18 +.$

Ex. 4. We first find the value of the annuity in arrears for the 20 years, or its worth when it expires. We have given \$100 = first term, 20 = No. terms, and 1.05 = ratio, to find the sum of the series. By **715**,

$$\frac{\$100 \times (1.05^{20} - 1)}{1.05 - 1} = \$3306.596, \text{ sum of series.}$$

This is what the lease is worth  $20 + 14 = 34$  years hence; therefore its present value, by **553**, is  $\$3306.596 \div 5.253348 = \$629.426 +$ , *Ans.*

Ex. 5.  $21 =$  No. terms,  $5 =$  first term,  $\frac{1}{4} =$  common diff.

By **706**,  $5 - (\frac{1}{4} \times 20) = 0$ , last term;

by **709**,  $\frac{0+5}{2} \times 21 = 52\frac{1}{2}$ , *Ans.*

Ex. 6.  $80 =$  last term,  $5 =$  common diff.,  $13 =$  No. terms; to find the first term, and the sum of the series.

Reversing the rule under **706**, we have  $(13 - 1) \times 5 = 60$ ;  $80 - 60 = 20$ , first day's journey. Then by **709**,  $\frac{20+80}{2} \times 13 = 650$ , whole distance traveled.

Ex. 7.  $15 \div 30 = \frac{1}{2}$ , the ratio; by **711**,  $30 \times \frac{1}{2\frac{1}{4}} = 16\frac{5}{4}$ , *Ans.*

Ex. 8. By **714**,  $\frac{(5 \frac{12 \times 4}{4} - 1) - 2}{3} = 20\frac{46}{3} = 682$ , *Ans.*

Ex. 9. We have given  $360 =$  sum of an arithmetical series,  $27 =$  first term, and  $45 =$  last term, to find the number of terms. By **709**, twice the sum of the series is equal to the sum of the extremes multiplied by the number of terms; conversely,  $\frac{360 \times 2}{27 + 45} = 10$ , *Ans.*

Ex. 10. By **712**,  $\sqrt[5]{15625} = 5$ , *Ans.*

Ex. 11.  $\$500 =$  first term,  $10 =$  No. terms,  $1.06 =$  ratio; to find the sum of the series. By

$$\frac{\$500 \times (1.06^{10} - 1)}{1.06 - 1} = \frac{\$395.424}{.06} = \$6590.40, \text{ Ans.}$$

Ex. 12. Reversing the rule under **709**, we have  $\frac{408 \times 2}{8} = 102$ , the sum of the extremes. Now, since 6 is the common difference, and 8 the number of terms,  $(8 - 1)$

$\times 6 = 42$  is the difference of the extremes; hence by Prob. 33, **127**,  $\frac{102+42}{2} = 72$ , last term; and  $\frac{102-42}{2} = 30$ , first term.

**Ex. 13.** We have \$1196 = the sum of an arithmetical series, 13 = No. of terms, and \$12 = the common difference, to find the first and last terms. Proceeding as in the last example,  $\frac{\$1196 \times 2}{13} = \$184$ , the sum of the extremes;  $(13-1) \times 12 = \$144$ , the difference of the extremes.  $\frac{\$184 - \$144}{2} = \$20$ , first payment;  $\frac{\$184 + \$144}{2} = \$164$ , last payment.

**Ex. 14.** \$2 = first term of a geometrical series, \$512 = last term, and 4 = ratio; to find the number of terms, and the sum of the series.

*First*, by **713**,  $512 \div 2 = 256$ ;  $256 \div 4 = 64$ ;  $64 \div 4 = 16$ ;  $16 \div 4 = 4$ ; and  $4 \div 4 = 1$ . Hence  $4 + 1 = 5$ , number of payments.

*Second*, by **714**,  $(\frac{\$512 \times 4}{4-1}) - 2 = \$682$ , indebtedness.

**Ex. 15.** \$4800 = first term, 5 = No. terms,  $1\frac{1}{2}$  = ratio; to find the last term, and the sum of the series.

By **711**,  $\$4800 \times (1\frac{1}{2})^4 = \$24300$ , share of eldest;  
 $(\$24300 \times 1\frac{1}{2}) - \$4800$

By **714**,  $\frac{\quad}{1\frac{1}{2} - 1} = \$63300$ , property.

**Ex. 16.** \$2818.546 = sum of series, 5 = No. terms, 1.06 = ratio; to find the first term. Reversing the rule under **715**, as in Ex. 2, we have

$$\$2818.546 \times \frac{1.06 - 1}{1.06^5 - 1} = \frac{\$169.11276}{.338226} = \$500, \text{ Ans.}$$

**Ex. 17.** \$10 = first term, \$7290 = last term, 3 = ratio, to find the number of terms, and the sum of the series.

By **713**,  $7290 \div 10 = 729$ ;  $729 \div 3 = 243$ ;



$243 \div 3 = 81$ ;  $81 \div 3 = 27$ ;  $27 \div 3 = 9$ ;  $9 \div 3 = 3$ ;  
 $3 \div 3 = 1$ ;  $6 + 1 = 7$ , payments.

By **714**,  $(\$7290 \times 3) \div 2 = \$10930$ , debt.

**Ex. 18.** If we take the distance traveled in going to the several stations and returning, we shall have an arithmetical series, of which 10 mi.=the first term, 50 mi.=the last term, and 180 mi.=the sum. We are to find the number of terms and the common difference. Reversing rule under **709**, we have  $\frac{180 \times 2}{10 + 50} = 6$ , No. stations. And reversing rule under **706**,  $\frac{50 - 10}{6 - 1} = 8$ , common difference; hence  $8 \div 2 = 4$  mi., distance between the stations.

**Ex. 19.** We first find the amount of the annuity in arrears for 12 years, by **715**.

$$\frac{\$200 \times (1.06^{12} - 1)}{1.06 - 1} = \$3373.99 +, \text{ amount.}$$

Since this will be the value of the annuity when it expires, we must find its present worth, at 6% compound interest for  $6 + 12 = 18$  years. By **553**,  $\$3373.99 \div 2.854339 = \$1182.05 +$ , *Ans.*

**Ex. 20.** We have a geometrical series, in which \$6=first term, 1.06=ratio, and  $60 - 16 = 44 = \text{No. terms}$ .

$$\text{Hence, } \frac{\$6 \times (1.06^{44} - 1)}{1.06 - 1} = \$1198.548, \text{ saved by dispensing with tobacco; and } \$1198.544 + \$500 = \$1698.548, \text{ Ans.}$$

**Ex. 21.** The value of a perpetuity when entered upon, is a sum whose annual interest=the perpetuity; hence,  $\$100 \div .05 \% = \$2000$ , value when entered upon.

(416, 417)



Since this is the value 30 years hence, we find its present value by **553**, thus:

$$\$2000 \div 4.321942 = \$462.75 +, \text{Ans.}$$

**Ex. 22.** *First*; \$2000 is the amount of a certain sum at simple interest  $21 - 12 = 9$  years at 7%. That is, \$2000 is the last term of an arithmetical series, .07 times the first term is the common difference, and  $9 + 1$  is the number of terms; and from these data we are to find the first term. Assuming a series of which \$1 is the first term, \$.07 the common difference, and 10 the number of terms, by **780**, we find the last term to be  $\$1 + (\$.07 \times \overline{10 - 1}) = \$1.63$ . Now, since \$1.63 is the last term of an arithmetical series of which \$1 is the first term, \$2000 must be the last term of a similar series, the first term of which is  $\$2000 \div 1.63 = \$1226.993 +$ , the sum left at 7% simple interest.

*Second*; \$2000 is the sum of a geometrical series, 1.03 is the ratio, and  $(\overline{21 - 12} \times 2) + 1 = 19$  is the number of terms; and we are required to find the first term. By **711**, we have  $\$2000 \div 1.03^{19-1} = \$2000 \div 1.702433 = \$1174.789 +$ , the sum left at 6% compound interest payable semi-annually.

**Ex. 23.** The prices of the several pieces form an arithmetical series, of which \$136 = sum, \$4 = the com. diff., \$31 = the last term, and 8 = the No. terms. By **706**,  $31 - (\overline{8 - 1} \times 4) = 3$ , first term, or the value of the first piece; and as the price of this piece was \$1. per yard,  $\$3 \div \$1 = 3$  yards in the first piece. Now, the number of yards in the several pieces form a series, the first term of which is 3, the common difference is 2, and the number of terms is 8. Hence,

$3+2(8-1)=17$  yd. in longest piece;

$\frac{17+3}{2} \times 8=80$  " whole quantity.

We now have 3 yd., 5 yd., 7 yd., 9 yd., 11 yd., 13 yd., 15 yd., 17 yd., lengths;

\$3, \$7, \$11, \$15, \$19, \$23, \$27, \$31, prices;

\$1,  $1\frac{2}{5}$ ,  $1\frac{4}{7}$ ,  $1\frac{2}{3}$ ,  $1\frac{8}{11}$ ,  $1\frac{10}{13}$ ,  $1\frac{14}{5}$ ,  $1\frac{14}{7}$ , prices per yard.

Ex. 24.  $600$ —sum of series,  $2$ —ratio, and  $320$ —greatest extreme.

*First*, to find the No. of bushels of the first kind. According to the rule under **714**, the sum of the series multiplied by the ratio less 1, is equal to the difference between the last term multiplied by the ratio and the first term; hence,  $600 \times (2-1)=600$ , difference between the last term multiplied by the ratio, and the first term. Then,  $320 \times 2=640$ ; and  $640-600=40$  bu. of the first kind.

*Next*, to find the number of terms.  
 $320 \div 40=8$ ;  $8 \div 2=4$ ;  $4 \div 2=2$ ;  $2 \div 2=1$ ;  
 hence,  $3+1=4$  kinds. *Ans.*

## MISCELLANEOUS EXAMPLES.

(Page 418.)

Ex. 1.  $18 \times 2=36$ ;  $36 \times 36=1296$  sq. ft. in both sides of the roof. But  $1296$  sq. ft.= $12.96$  squares of  $100$  ft. each; and since  $1000$  shingles make  $1$  square, (282, Note 3), there will be  $12.96$  M. shingles.

Ex. 2.  $70 \text{ mi.} \times \frac{2}{7} \times \frac{4}{7} \times \frac{1}{3}=3.80952+$  mi.  
 $1.375 \text{ mi.} \times .73 =1.00375$  mi.

2.80577 mi., *Ans.*

(417, 418)

Ex. 3.  $91\frac{1}{2} \div \frac{2}{3} = 137\frac{1}{4}$ , the whole remainder;  
 $137\frac{1}{4} + 7\frac{1}{2} = 144\frac{3}{4}$ , *Ans.*

Ex. 4.  $\frac{\frac{4}{9} \times 6}{4} = \frac{4}{9} \times \frac{6}{1} \times \frac{1}{4} = \frac{2}{3}$ , *Ans.*

Ex. 5.  $50 \left\{ \begin{array}{c|c|c} 0 & \frac{1}{50} & \\ \hline 10 & & \frac{1}{40} \\ 70 & & \frac{1}{20} \\ \hline 80 & \frac{1}{30} & \end{array} \right\} \left\| \begin{array}{c} 3 \\ 2 \\ 4 \\ 5 \end{array} \right\} \left\{ \begin{array}{c} 3 \\ 2 \\ 4 \\ 5 \end{array} \right\} \text{Ans. 3 gal. of water, 2}$   
of cider, 4 of wine, and  
5 of brandy.

Ex. 6. A number increased by  $\frac{1}{2}$ ,  $\frac{1}{3}$  and  $\frac{1}{4}$  of itself, will be  
 $1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} = 2\frac{1}{12}$  times the number; hence  $125 \div$   
 $2\frac{1}{12} = 60$ , *Ans.*

Ex. 7. From noon to midnight is 12 hours; and since the  
time past noon is  $\frac{2}{3}$  of the time to midnight, the  
whole 12 h. must be  $1\frac{2}{3}$  times the time to midnight  
Hence  $12 \text{ h.} \div 1\frac{2}{3} = 7 \text{ h. } 12 \text{ min.}$ , time to midnight;  
 $12 \text{ h.} - 7 \text{ h. } 12 \text{ min.} = 4 \text{ h. } 48 \text{ min.}$ , P. M., *Ans.*

Ex. 8.  $\$10 \times 12 = \$120$

$$8\frac{2}{3} \times 3 = 26$$

$$7\frac{1}{2} \times 8 = 60$$

$$\begin{array}{r} 23 \end{array} ) \$206$$

$$\$8\frac{2}{3}, \text{ Ans.}$$

Ex. 9. Int. on \$240 for 4 mo. 26 da., at 1 % = \$.974;  
 $\$5.84 \div \$.97\frac{1}{3} = 6 \%$ , *Ans.*

Ex. 10.  $\left\{ \begin{array}{c} 24 \\ 189 \\ 10 \end{array} \right\} : \left\{ \begin{array}{c} 217 \\ 5\frac{1}{2} \\ (?) \end{array} \right\} = \left\{ \begin{array}{c} 33\frac{3}{4} \\ 2\frac{2}{3} \\ 5\frac{1}{4} \end{array} \right\} : \left\{ \begin{array}{c} 23\frac{1}{4} \\ 2\frac{1}{3} \\ 3\frac{2}{3} \end{array} \right\}$   
 $(?) = \frac{24}{1} \times \frac{189}{1} \times \frac{10}{1} \times \frac{1}{217} \times \frac{2}{11} \times \frac{4}{135} \times \frac{3}{8} \times \frac{4}{21} \times \frac{93}{4} \times$   
 $\frac{7}{2} \times \frac{1}{3} = 16 \text{ h.}$ , *Ans.*

Ex. 11  $\$450 \times .05 \times 6\frac{5}{8} = \$153.75$ , interest;  
 $\$450 \div 1.34\frac{1}{8} = \$335.40$ , present worth;

$$\begin{aligned} \$450 - \$335.40 &= \$114.60, \text{ discount;} \\ \$153.75 - \$114.60 &= \$39.15, \text{ Ans.} \end{aligned}$$

$$\begin{aligned} \text{Ex. 12. } \$6300 \times \frac{8}{7} &= \$7200, \text{ elder brother received;} \\ \$6300 + \$7200 &= \$13500, \text{ Ans.} \end{aligned}$$

$$\begin{aligned} \text{Ex. 13. } .\dot{7} &= \frac{7}{9}; .\dot{8}\dot{8} = \frac{88}{99} = \frac{8}{9}; .\dot{7}2\dot{7} = \frac{727}{999}; \\ .9\dot{1}32\dot{5} &= \frac{91325}{99990} = \frac{91316}{99990} = \frac{45658}{49995}. \end{aligned}$$

$$\text{Ex. 14. } \$438 \times \frac{112\frac{1}{2}}{90} = \$547.50, \text{ Ans.}$$

$$\begin{aligned} \text{Ex. 15. Int. on } \$1 \text{ for 4 mo. 3 da.} &= \$.0239\frac{1}{6}; \\ \$1 - \$.0239\frac{1}{6} &= \$.9760\frac{5}{6}, \text{ proceeds of } \$1; \\ \$875.50 \div .9760\frac{5}{6} &= \$896.95+, \text{ Ans.} \end{aligned}$$

$$\begin{aligned} \text{Ex. 16 } \$228.00 \div 5 &= \$45.60, \text{ A's monthly gain;} \\ 266.40 \div 8 &= 33.30, \text{ B's " } \\ 330.00 \div 12 &= 27.50, \text{ C's " } \\ &\quad \underline{\hspace{1.5cm}} \\ &\quad \$106.40, \text{ entire " } \end{aligned}$$

$$\begin{aligned} \$2128 \times \frac{456}{1064} &= \$912, \text{ A's stock;} \\ 2128 \times \frac{333}{1064} &= 666, \text{ B's " } \\ 2128 \times \frac{275}{1064} &= 550, \text{ C's " } \end{aligned}$$

$$\begin{aligned} \text{Ex. 17 } \$.35 \times 300 &= \$105, \text{ due Oct. 27;} \\ .40 \times 150 &= 60, \text{ " " 31;} \\ .38 \times 500 &= 190, \text{ " Nov. 7;} \\ .42 \times 200 &= 84, \text{ " " 12;} \\ .40 \times 250 &= 100, \text{ " " 25;} \end{aligned}$$

Hence, taking Oct. 27 for a focal date,

$$105 \times 0 = 000$$

$$60 \times 4 = 240$$

$$190 - 11 = 2090$$

$$84 \times 16 = 1344$$

$$100 \times 29 = 2900$$

$$6574 \div 539 = 12 \text{ da.};$$

$$\text{Oct. 27} + 12 \text{ da.} = \text{Nov. 8, Ans.}$$

---


$$539$$

---


$$6574$$

- Ex. 18. A, B, and C do  $\frac{1}{12}$  of it in 1 day ;  
 C does  $\frac{1}{24}$  of it, and A  $\frac{1}{34}$  ; hence,  
 B can do  $\frac{1}{12} - (\frac{1}{24} + \frac{1}{34}) = \frac{5}{408}$  in 1 day ; and  
 $408 \div 5 = 81\frac{3}{5}$  days, *Ans.*
- Ex. 19. We here have an arithmetical series, of which  $7 =$   
 the first term,  $51 =$  last term, and  $4 =$  com. diff. ;  
 by **708**,  $\frac{51-7}{4} + 1 = 12$  da., time ;  
 and by **709**,  $\frac{51+7}{2} \times 12 = 348$  mi., distance.
- Ex. 20.  $\$2500 \times .0180\frac{5}{8} = \$45.21 -$ , bank discount ;  
 $\$2500 \div 1.0175 = \$2457.00 +$ , true present worth ;  
 $\$2500 - \$2457 = \$43$ , true discount ;  
 $\$45.21 - \$43 = \$2.21$ , *Ans.*
- Ex. 21.  $\$5 \div 1.035 = \$4.830 +$ , present worth of \$5 ;  
 hence this is the better condition by  $\$4.875 -$   
 $\$4.83 = \$0.045$ .
- Ex. 22. Since, if sold at cost,  $\frac{1}{2}$  of the lot should have sold  
 for only  $\frac{1}{2}$  of the cost, the gain on  $\frac{1}{2}$  was  $\frac{5}{8} - \frac{1}{2} = \frac{1}{8}$   
 of the cost ; and  $\frac{1}{8} \div \frac{1}{2} = 25$  %, *Ans.*
- Ex. 23. 
$$\left\{ \begin{array}{l} \$500 \\ 1 \text{ yr.} \end{array} \right. : \$50 = \left\{ \begin{array}{l} \$960 \\ (?) \end{array} \right. : \$60$$
  
 $(?) = \frac{500 \times 60}{960 \times 50} = \frac{5}{8} \text{ yr.} = 7 \text{ mo. } 15 \text{ da.}, \text{ } \textit{Ans.}$
- Ex. 24. The remainder, which is 88 % of the whole, must be  
 sold for 125 % of the cost of the whole ; hence  $125$   
 $\div 88 = 1.42\frac{1}{2}$  ;  $1.42\frac{1}{2} - 1 = 42\frac{1}{2}$  % above cost.
- Ex. 25.  $\frac{365 + .0675}{2} = 182.53375$ , greater ;  
 $\frac{365 - .0675}{2} = 182.46625$ , less.
- Ex. 26.  $7 \text{ yr.} = 84 \text{ mo.} ; 3 \text{ yr. } 10 \text{ mo. } 15 \text{ da.} = 46\frac{1}{2} \text{ mo.} ;$   

$$\left\{ \begin{array}{l} 445.625 \\ 84 \end{array} \right. : \left\{ \begin{array}{l} 650 \\ 46\frac{1}{2} \end{array} \right. = 128.99 : (?)$$
  
 $(?) = \frac{650 \times 46.5 \times 128.99}{445.625 \times 84} = \$104.15 +$ , *Ans.*



- Ex. 27.  $\frac{540 \times 150 \times 7}{56} = \$10125$ , invoice;  
 $\$10125 \times 1.26 = \$12757.50$ , sold for;  
 $\$12757.50 \times .015 = \$191.36$ , commission;  
 $\$12757.50 - \$191.36 = \$12566.14$ , net proceeds;  
 $\$12566.14 \div .995 = \$12629.28 +$ , *Ans.*
- Ex. 28.  $\$.194 \times 5000 = \$970$ , draft on Paris;  
 $5000 \div 5.20 = \$961.53 +$ , remittance from Paris.
- Ex. 29.  $\$1000 \div .065 = \$15384.61 +$ , stock required;  
 $\$15384.61 \times 1.05 = \$16153.84$ , *Ans.*
- Ex. 30.  $\$25000 \times \frac{70}{120} = \$14583.33\frac{1}{3}$ , stock at 8 %;  
 $\$25000 \times .06 = 1500.00$ , income of 6 % stock;  
 $\$14583.33\frac{1}{3} \times .08 = 1166.66\frac{2}{3}$ , " " 8 % "  


---

 $\$333.33\frac{1}{3}$ , *Ans.*
- Ex. 31.  $\$15190 \div .28 = \$54250$ , money of all.  
 Suppose A has  $\$1,$   
 B will have  $\frac{2}{3} \times \frac{4}{3} = \$\frac{8}{9},$   
 C " "  $\frac{8}{9} \times \frac{2}{3} \times \frac{5}{3} = \$\frac{80}{27},$  } proportionate terms.  
 Multiplying these proportioned terms by 81, we have  
 81, 72 and 80, the proportional terms of A, B, and  
 C respectively.  
 $81 + 72 + 80 = 233$ , sum of proportional terms;  
 $\$54250 \times \frac{81}{233} = \$18859.44 +$ , A's money;  
 $\$54250 \times \frac{72}{233} = 16763.95 +$ , B's "  
 $\$54250 \times \frac{80}{233} = 18626.61 +$ , C's "
- Ex. 32.  $21 - 14 = 7$  payments, or deposits. Now the last de-  
 posit will not draw interest; the last but one will  
 draw compound interest for 2 half years, and the  
 amount will be  $\$250 \times 1.03^2$ ; the last but two will  
 draw compound interest for 4 half years, and the  
 amount will be  $\$250 \times 1.03^4$ ; and so on. Hence  
 we have  $\$250 =$  first term,  $7 =$  No. terms, and  $1.03$

= the ratio, to find the sum of the series. Now  
 $(1.03^2)^7 = 1.03^{14}$ ; hence by **715**  

$$\frac{(1.03^{14} - 1) \times 250}{1.03 - 1} = \$2104.227 +, \text{ Ans.}$$

Ex. 33.  $\frac{3}{4} - \frac{2}{5} = \frac{7}{20}$  cents, profit on 1 peach;  
 $420 \div \frac{7}{20} = 1200, \text{ Ans.}$

Ex. 34. Since he is to cover 7% of the cost for expenses, and still clear  $12\frac{1}{2}\%$  on the cost, the sales, without allowing for credit or bad debts, must be  $100\% + 7\% + 12\frac{1}{2}\% = 119\frac{1}{2}\%$  of the cost. But, since the sales are on credit of 6 mo., the  $119.5\%$  is the present worth of the sales; and  $119.5 \times 1.03 = 123.085\%$ , the % of the cost, which the sales would be, without allowing for bad debts. Now, since 5% of the sales is lost by bad debts, the  $123.085\%$  of the cost is 95% of the sales. Hence  
 $123.085 \div .95 = 129.56 + \%$ , what the sales must be to cover all conditions; and  
 $129.56 - 100 = 29.56 + \%, \text{ Ans.}$

Ex. 35.  $28 \times 20 \times 10 = 5600$  days' work by 1st;  
 $25 \times 15 \times 12 = 4500$  " " 2d;  
 $18 \times 25 \times 11 = 4950$  " " 3d;  
 $15 \times 24 \times 8 = 2880$  " " 4th;  


---

 $17930$  " " all.  
 $\$8600 \times \frac{5600}{17930} = \$2686.00 +, \text{ 1st receives,}$   
 $\$8600 \times \frac{4500}{17930} = 2158.39 +, \text{ 2d "}$   
 $\$8600 \times \frac{4950}{17930} = 2374.24 +, \text{ 3d "}$   
 $\$8600 \times \frac{2880}{17930} = 1381.37 +, \text{ 4th "}$

Ex. 36.  $75 \times \frac{500}{100} \times \frac{64}{105} = 228\frac{4}{7}, \text{ Ans.}$

(419, 420)

Ex. 37.  $\$35.26 + \text{int. for 101 da.} = \$36.15$

$\$48.65 + \text{ " " 70 " } = 49.50$

$\$ 6.48 + \text{ " " 56 " } = 6.57$

$\$50.00 + \text{ " " 30 " } = 50.38$

$\$142.60, \text{ Ans.}$

Ex. 38. Had he received \$.35 per bushel less for the barley, the whole cost would have been  $\$.35 \times 56 = \$19.60$  less, or  $\$63.10 - \$19.60 = \$43.50$ . But in this case, the prices of barley and corn would be equal. Hence  $56 + 34 = 90$  bu., whole quantity;

$\$43.50 \div 90 = \$48\frac{1}{3}$ , price of corn;

$\$48\frac{1}{3} + \$.35 = \$83\frac{1}{3}$ , " " barley.

Ex. 39. Since \$12950 is the proceeds of the note discounted for 6 mo., (allowing 3 days grace),  $\$12950 \div .96441666 = \$13427.81$ , face of the note received for the flour, Dec. 1.

$\$13427.81 \div .85 = \$15797.42$ , value, Nov. 1;

$\$15797.42 \div 1.30 = 12151.86$ , " Oct. 1;

$\$12151.86 \div 1.25 = 9721.49$ , paid for flour;

$\$12950 - \$9721.49 = \$3228.51, \text{ Ans.}$

Ex. 40.  $\$660 \div 120 = \$5.50$ , mean price;

$$5.50 \left\{ \begin{array}{l|l|l} 5.75 & \frac{1}{25} & 2 \\ 5.00 & \frac{1}{50} & 1 \\ \hline & & 3 \end{array} \right| \begin{array}{l|l} 80 \\ 40 \\ \hline 120 \end{array} \text{ Ans. 80 bbl.}$$

Ex. 41. From the conditions of the question,

6 da. of 1st + 10 da. of 2d = \$38;

3 da. of 1st + 5 da. of 2d = \$19;

and 15 da. of 1st + 25 da. of 2d = \$95.

But 15 da. of 1st + 8 da. of 2d = \$61;

hence 17 da. of 2d = \$34;

and 1 da. of 2d = \$2.

Now, the 2d mechanic labored 8 da. + 10 da. = 18 da.;  
 hence,  $\$2 \times 18 = \$36$ , 2d received;  
 $\$61 + \$38 - \$36 = \$63$ , 1st “

Ex. 42.  $\$961.875 \div .15 = \$6412.50$ , net value;  
 $\$6412.50 \div \$.125 = 51300$  lb., net weight;  
 $180 \text{ lb.} \times .95 = 171$  lb., net weight of 1 box;  
 $51300 \div 171 = 300$  bags, *Ans.*

Ex. 43.  $\sqrt{4900} = 70$  lb., *Ans.*

Ex. 44. Had he worked 6 days in each week, he would have  
 received  $60 \times \$2 = \$120$ , and paid for board  $10 \times$   
 $\$4 = \$40$ , thus saving  $\$120 - \$40 = \$80$ ; hence  
 $\$80 - \$72 = \$8$ , deduction of wages for idle days;  
 and  $\$8 \div \$2 = 4$  da., idle;  $60 - 4 = 56$  da., he worked.

Ex. 45.  $\$250 \times 1.806111 = \$451.528$ , *Ans.*

Ex. 46.  $\$120 \div 100 = \$1.20$ , price per gal. of wine;

$$1.00 \left\{ \begin{array}{c|c|c} 0 & \frac{1}{100} & 1 \\ 1.20 & \frac{1}{20} & 5 \end{array} \right\} \frac{16\frac{2}{3}}{83\frac{1}{3}} \quad \text{Ans. } 16\frac{2}{3} \text{ gal.}$$

$$\left\{ \begin{array}{c|c} 1 & 16\frac{2}{3} \\ 9 & 83\frac{1}{3} \\ 2 & 100 \end{array} \right\}$$

Ex. 47. The quantity of water discharged by a pipe varies as  
 the area of a section of the pipe, and consequently  
 as the square of the diameter. Hence

$$\left\{ \begin{array}{c} 1 \\ 9 \\ 2 \end{array} \right\} : \left\{ \begin{array}{c} 3 \\ 4 \\ (?) \end{array} \right\} = 1 : 3$$

$$(?) = 2 \text{ h.} \times \frac{2}{4} \times \frac{1}{3} \times \frac{3}{1} = 4 \text{ h. } 30 \text{ min., } \text{Ans.}$$

Ex. 48.  $\$4981.50 \div 1.025 = \$4860$  to be distributed;  
 $\$4860 \div \$8100 = .60 = 60\%$ , *Ans.*

Ex. 49. His asking price was 125% of the cost, and the sell-  
 ing price was  $1.25 \times .86 = 1.075 = 107\frac{1}{2}\%$  of the  
 cost; hence,



$$\$170 \div .075 = \$2266.66\frac{2}{3}, \text{ cost ;}$$

$$\$2266.66\frac{2}{3} + \$170 = \$2436.66\frac{2}{3}, \text{ sold for ;}$$

$$\$2266.66\frac{2}{3} \times 1.25 = \$2833.33\frac{1}{3}, \text{ asking price.}$$

Ex. 50.  $231 \text{ cu. in.} \times 2000 = 462000 \text{ cu. in., solid contents ;}$   
 $\sqrt[3]{462000} = 77.3 + \text{in.} = 6 \text{ ft. } 5.3 \text{ in.} +, \text{Ans.}$

Ex. 51.  $21 \text{ yr.} - 13 \text{ yr.} = 8 \text{ yr., 1st sum at interest ;}$

$$21 \text{ yr.} - 15 \text{ yr.} = 6 \text{ yr., 2d " "}$$

$$21 \text{ yr.} - 16\frac{1}{2} \text{ yr.} = 4\frac{1}{2} \text{ yr., 3d " "}$$

$$\text{Now, } \$ .06 \times 8 = \$ .48, \text{ int. of } \$1 \text{ of the first sum,}$$

$$\$ .06 \times 6 = .36, \text{ " " " second "}$$

$$\$ .06 \times 4\frac{1}{2} = .27, \text{ " " " third "}$$

$$\text{And } \$ \frac{1}{1.48} = \text{present worth of } \$1 \text{ of the first sum ;}$$

$$\$ \frac{1}{1.36} = \text{ " " " " second "}$$

$$\$ \frac{1}{1.27} = \text{ " " " " third "}$$

Hence, the \$5000 must be divided into parts proportional to  $\frac{1}{1.48}$ ,  $\frac{1}{1.36}$  and  $\frac{1}{1.27}$ ; or, reducing to a common denominator, and using the numerators (418, III), the proportional terms are

$$17272, 18796, 20128. \text{ Then}$$

$$17272 + 18796 + 20128 = 56196$$

$$56196 : 17272 = \$5000 : (?) = \$1536.76 +, \text{ 1st ;}$$

$$56196 : 18796 = \$5000 : (?) = \$1672.36 +, \text{ 2d ;}$$

$$56196 : 20128 = \$5000 : (?) = \$1790.88 -, \text{ 3d.}$$

Ex. 52. Let A B, B C, C D, D E, E F,

and F G, represent the distances

sailed on the successive days. A

G will be the distance the ship de-

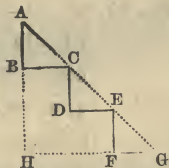
parted from A, and A H + H G,

or 2 A H, will be equal to the whole distance the

ship sailed. Hence  $A G^2 = 118.794^2 = 14112$ , near-

$$\text{ly ; } 14112 \div 2 = 7056 = A H^2 ;$$

$$\sqrt{7056} = 84 = A H ; 84 \times 2 = 168 \text{ mi., Ans.}$$





Ex. 53.  $4 \text{ P.} \times 110 = 440 \text{ gal.};$   
 $\$2.15 \times 440 = \$946, \text{ first cost};$   
 $\$946 \times .24 = 227.04, \text{ duty};$   
 $57.60, \text{ freight};$   


---

 $\$1230.64, \text{ whole cost};$   
 $\$1980 - \$1230.64 = \$749.36, \text{ gain};$   
 $\$749.36 \div \$1230.64 = 60.89 + \%, \text{ Ans.}$

Ex. 54. We form equations, as in Arbitration of Exchange, the question being how many bushels of corn [(?) corn] are equal to 5 bbl. of flour.

(?) bu. corn = 5 bbl. flour;  
 17 bu. wheat = 34.5 bu. corn;  
 59.5 bu. oats = 9 bu. wheat;  
 42 lb. flour = 6 bu. oats;  
 1 bbl. flour = 196 lb. flour;  


---

 (?) =  $42\frac{2}{3}\frac{8}{9}$ , Ans.

Ex. 55.  $100 - 8 \div 92 \%$ , price of the stock;  $92 \% : (?) = 10 \% : 7 \%$  (?) =  $\frac{92 \times 7}{10} = 64.4 \%$ ;  $100 - 64.4 = 35.6 \%$  discount, Ans.

Ex. 56.  $\pounds 400 \times \frac{40}{9} = \$1777\frac{7}{9}$ , old par value;  
 $\$2000 - \$1777\frac{7}{9} = \$222\frac{2}{9}$ , premium;  
 $\$222\frac{2}{9} \div \$1777\frac{7}{9} = 12\frac{1}{2} \%$ , Ans.

Ex. 57.  $21 \text{ mi.} - 7 \text{ mi.} = 14 \text{ mi.}$ , B gains of A daily;  
 $84 \div 14 = 6$ ; hence A and B are together every 6 days.  $7 \text{ mi.} + 14 \text{ mi.} = 21 \text{ mi.}$ , A and C approach each other daily;  $14 \text{ mi.} + 14 \text{ mi.} = 28 \text{ mi.}$ , B and C approach each other daily;  $84 \div 21 = 4$ ; that is, A and C meet every 4 days;  
 $84 \div 28 = 3$ ; that is, B and C meet every 3 days;  
 Now, since A and B meet every 6th day, A and C

every 4th day, and B and C every 3d day, the interval of time required for all to meet, is the least common multiple of 6 da., 4 da. and 3 da.=12 da.

Ex. 58.

10463	4	43200 41852
9436	7	1348
1027	1	1027
963	3	321
64	5	320

$$\frac{10463}{43200} = \frac{1}{4} + \frac{1}{7} + \frac{1}{1} + \frac{1}{3} + \frac{1}{5} + \text{etc.}$$

The approximating fractions are  $\frac{1}{4}$ ,  $\frac{7}{29}$ ,  $\frac{8}{33}$ ,  $\frac{31}{128}$ , and  $\frac{163}{673}$ .

Hence, there must be a leap year once in four years, 7 times in 28 years, 8 times in 33 years, 31 times in 128 years, or 163 times in 673 years.

Ex. 59.  $\$14071 \div 10000 = \$1.4071$ , the amount of \$1 for the time he owned the farm. By reference to the table of Compound Interest, we find that the time in which \$1 at 5% will amount to \$1.4071, is 7 years.

Now, 11 yr.—7 yr.=4 yr., the perpetuity in reversion when he purchased it.

$\$14071 \times .06 = \$844.26$ , the perpetuity which his money would purchase, if it were to be entered upon immediately; and the equivalent perpetuity in reversion 4 years, is the amount of \$844.26 at 6% compound interest, for 4 years. Hence,

$$\$844.06 \times 1.26247 = \$1065.85, \text{ Ans.}$$

Ex. 60.  $\$1 \div 1.035 = \$.966 =$ , cash value of \$1;

$$\$1 - \$.966 = \$.034, \text{ gain on } \$.966;$$

$$\$0.034 \div \$.966 = .035 +, \text{ Ans.}$$

Ex. 61. The several investments will form a geometrical series, of which the last will be the first term; the last but one multiplied by 1.05, the second term; and so on. Hence  $1.05 = \text{ratio}$ ,  $50 - 21 = 29 = \text{No. terms}$ ,

(421, 422)

and \$30000 = the sum of the series ; we are to find the first term.

Reversing the rule under **715**, we have

$$\frac{\$30000 \times (1.05 - 1)}{1.05^{29} - 1} = \frac{\$1500}{3.116136} = \$481.37, \text{ Ans.}$$

Ex. 62. The shares of the other two must be as 4 to 5 ; hence  
 $4 + 5 = 9 ;$

$$\$10000 \times \frac{4}{9} = \$4444\frac{4}{9}, \text{ share of 2d ;}$$

$$\$10000 \times \frac{5}{9} = \$5555\frac{5}{9}, \quad \text{“} \quad \text{“} \quad \text{3d.}$$

Ex. 63. (?) hhd. = 1500 bbl. ;

$$50 \text{ bbl.} = 125 \text{ yd. ;}$$

$$80 \text{ yd.} = 6 \text{ bales ;}$$

$$13 \text{ bales} = 3\frac{1}{2} \text{ hhd. ;}$$

$$(?) = 75\frac{75}{104} \text{ hhd., Ans.}$$

Ex. 64.  $11\frac{1}{4} - 5 = 6\frac{1}{4}$  mi., the 7th gains of the 1st, daily ;

$$11\frac{1}{4} - 6\frac{1}{4} = 5 \quad \text{“} \quad \text{“} \quad \text{“} \quad \text{“} \quad \text{2d} \quad \text{“}$$

$$11\frac{1}{4} - 7\frac{1}{3} = 3\frac{1}{12} \quad \text{“} \quad \text{“} \quad \text{“} \quad \text{“} \quad \text{3d} \quad \text{“}$$

$$11\frac{1}{4} - 8\frac{1}{4} = 3 \quad \text{“} \quad \text{“} \quad \text{“} \quad \text{“} \quad \text{4th} \quad \text{“}$$

$$11\frac{1}{4} - 9\frac{1}{2} = 1\frac{3}{4} \quad \text{“} \quad \text{“} \quad \text{“} \quad \text{“} \quad \text{5th} \quad \text{“}$$

$$11\frac{1}{4} - 10\frac{1}{4} = 1 \quad \text{“} \quad \text{“} \quad \text{“} \quad \text{“} \quad \text{6th} \quad \text{“}$$

Hence, The 7th will pass the 1st once in  $\frac{120}{6\frac{1}{4}}$  da. ;

$$\text{“} \quad \text{“} \quad \text{“} \quad \text{2d} \quad \text{“} \quad \text{“} \quad \frac{120}{5} \quad \text{“}$$

$$\text{“} \quad \text{“} \quad \text{“} \quad \text{3d} \quad \text{“} \quad \text{“} \quad \frac{120}{3\frac{1}{12}} \quad \text{“}$$

$$\text{“} \quad \text{“} \quad \text{“} \quad \text{4th} \quad \text{“} \quad \text{“} \quad \frac{120}{3} \quad \text{“}$$

$$\text{“} \quad \text{“} \quad \text{“} \quad \text{5th} \quad \text{“} \quad \text{“} \quad \frac{120}{1\frac{3}{4}} \quad \text{“}$$

$$\text{“} \quad \text{“} \quad \text{“} \quad \text{6th} \quad \text{“} \quad \text{“} \quad \frac{120}{1} \quad \text{“}$$

And the time required for the 7th to pass *all* the others at the same place, will be the least common multiple of the above intervals, which is found by dividing the least common multiple of the numerators by the greatest common divisor of the denominators. Least common multiple of  $120=120$ ; Greatest common divisor of  $6\frac{1}{4}$ , 5,  $3\frac{1}{12}$ , 3,  $1\frac{3}{4}$ , and 1  $=\frac{1}{12}$ ; hence  $120 \div \frac{1}{12} = 1440$  da., *Ans.*

Ex. 65. 1 da. = 86400 sec.

$86400 - 20 = 86380$ , No. beats 1st makes in 1 da.;

$86400 + 15 = 86415$ , “ “ 2d “ “ “

$\frac{86400}{86380} = \frac{4320}{4319}$  sec., time in which 1st makes 1 beat;

$\frac{86400}{86415} = \frac{5760}{5761}$  sec., “ “ “ 2d “ “ “

Now, the least common multiple of  $\frac{4320}{4319}$  sec. and  $\frac{5760}{5761}$  sec. is  $\frac{17280}{7}$  sec., which is the interval of time that must elapse before the two pendulums will beat in unison. But in this time the 1st pendulum will make  $\frac{17280}{7} \div \frac{4320}{4319} = 2468$  beats; and the 2d pendulum will make  $\frac{17280}{7} \div \frac{5760}{5761} = 2469$  beats. Therefore, 2468 sec. = 41 min. 8 sec. P. M., time by 1st; 2469 sec. = 41 min. 9 sec. P. M., “ “ 2d.

Ex. 66.  $(3^{30} - 1) \times \frac{1}{3} \quad 3^{30} - 1$   
 $\frac{\quad}{3-1} = \frac{\quad}{6} = 343,518,868,2441\frac{1}{3}$  in.;

$343,518,868,2441\frac{1}{3} \div 63360 = 541590730\frac{2021}{4320}$  mi.

Ex. 67.  $105\% : 85\% = (?) : 6\%$   $(?) = \frac{105 \times 6}{85} = 7\frac{7}{17}\%$ .

Ex. 68. A. P.

$6 + 7 = \$ .33$ , 1st condition;

$10 + 8 = .44$ , 2nd “

$1st \times 5 = 30 + 35 = \$1.65$

$2d \times 3 = 30 + 24 = 1.32$

$11 = \$ .33$

$\$.33 \div 11 = 3$  cents, price of one peach;

$\$.03 \times 7 = \$.21$ ;  $\$.33 - \$.21 = \$.12$ , price of 6 apples;

$\$.12 \div 6 = 2$  cents, price of 1 apple.

Ex. 69. If A has \$9

B will have 5

and C will have  $\frac{3}{7}$  of \$5 =  $2\frac{1}{7}$

$\$16\frac{1}{7}$

$\frac{2\frac{1}{7}}{16\frac{1}{7}} = \frac{15}{113}$ , C's part of the whole estate;

$\$3862.50 \div \frac{15}{113} = \$29097.50$ , Ans.

Ex. 70. C. R.

$16 + 20 = \$30$ , 1st condition;

$24 + 10 = 27$ , 2d “

$1st \times \frac{3}{2} = 24 + 30 = 45$

$20 = 18$

$\$18 \div 20 = \$.90$ , price per bu. for rye;

hence, from 1st or 2d, \$.75, “ “ corn.

Ex. 71. For 1 ox worth \$28,

there were 2 cows “ 34

and 6 sheep “ 45

$\$107$

$\$749 \times \frac{28}{107} = \$196$ , sum paid for oxen

$749 \times \frac{34}{107} = 238$ , “ cows;

$749 \times \frac{45}{107} = 315$ , “ sheep;

hence,  $\$196 \div \$28 = 7$  oxen,

$238 \div 17 = 14$  cows;

$315 \div 7.50 = 42$  sheep.

Ex. 72.  $\$25000 \div .76 = \$32894.73 +$ , Ans.

Ex. 73. The difference between the coat and \$20, and the coat and \$9, is  $\$20 - \$9 = \$11$ , which must be the



ratable wages for  $20-12=8$  weeks. Hence

$\$11 \div 8 = \$1\frac{3}{8}$ , one week's wages ;

$\$1\frac{3}{8} \times 20 = \$27.50$ , wages for 20 weeks ;

and  $\$27.50 - \$20 = \$7.50$ , value of coat.

Ex. 74. 540 A. 36 P. = 86436 sq. rd. ;

$\sqrt{86436} = 294$  rd., one side of square piece ;

$86436 \div 42 = 2058$  sq. rd., in each of equal square ;

$\sqrt{2058} = 45.3 +$  rd., side of one of equal squares.

Ex. 75. 25 A. = 4000 sq. rd. ;  $\sqrt{4000} = 63.245 +$  rd., one

side of the square field ;  $63.245 \text{ rd.} \times 4 = 252.980$

rd., perimeter of the square field.  $4000 \div 2 = 2000$  ;

$\sqrt{2000} = 44.721$  rd., width of the rectangle ;  $44.721$

rd.  $\times 2 = 89.442$  rd., length of the rectangle ;  $(44.721$

rd.,  $+ 89.442 \text{ rd.}) \times 2 = 268.326$  rd., perimeter of

the rectangle ;  $268.326 \text{ rd.} - 252.980 \text{ rd.} = 15.346$

rd., difference of the perimeters ;

$\$.625 \times 15.346 = \$9.59 +$ , Ans.

Ex. 76. The hour and minute hands start together at 12 o'clock ; at 1 o'clock the hour hand has passed over 1 twelfth of the dial, while the minute hand has passed over the whole dial. Therefore, the minute hand gains of the hour hand at the rate of  $\frac{11}{12}$  of the dial in 60 min. But, at 5 o'clock the minute hand has  $\frac{5}{12}$  of the dial to gain of the hour hand, before passing it. Hence

$\frac{11}{12} : \frac{5}{12} = 60 \text{ min.} : (?) = 27 \text{ min. } 16\frac{4}{11} \text{ sec.}$

Ans 27 min.  $16\frac{4}{11}$  sec. past 5 o'clock.

Ex. 77. It is evident that, to increase the number in both rank and file by 1 man, would require twice the number in rank and file at first, plus 1 (for the man

at the corner). And, since to effect this requires  
 $284 + 25 = 309$  men,  $\frac{309}{2} - 1 = 154$  is the number of  
 men in rank or file at first.

Hence  $154^2 + 284 = 24000$ , *Ans.*

Ex. 78. 7 = first proportional term,

9 = second " "

$7 \times \frac{4}{3} = 9\frac{1}{3}$  = third

$25\frac{1}{3}$  = sum of " terms.

$25\frac{1}{3} : 7 = \$3648 : (?) = \$1008$

$25\frac{1}{3} : 9 = \$3648 : (?) = \$1296$

$25\frac{1}{3} : 9\frac{1}{3} = \$3648 : (?) = \$1344$

Ex. 79. 6 A. 3 R. 12 P. = 1092 P. Then by **691**,

$13 \times 21 = 273$ ;  $1092 \div 273 = 4$ ;  $\sqrt{4} = 2$ ;

$13 \times 2 = 26$  rd., width;  $21 \times 2 = 42$  rd., length;

$(26 \text{ rd.} + 42 \text{ rd.}) \times 2 = 136 \text{ rd. of fence.}$

Ex. 80. A, B, C, and D, do  $\frac{1}{13} = \frac{7980}{103740}$  of it in 1 day;

A, B, C, and E, "  $\frac{1}{15} = \frac{6916}{103740}$  " "

A, B, D, and E, "  $\frac{1}{12} = \frac{8645}{103740}$  " "

A, C, D, and E, "  $\frac{1}{9} = \frac{5460}{103740}$  " "

B, C, D, and E, "  $\frac{1}{14} = \frac{7440}{103740}$  " "

Taking the sum of the fractions, we shall have 4  
 days' work of each man. Consequently

A, B, C, D, and E do  $\frac{36411}{414960}$  of it in 4 days; and

A, B, C, D, and E "  $\frac{36411}{414960}$  " 1 day.

Hence,  $414960 \div 36411 = 11\frac{4813}{12137}$  da. required for

all. If, now, from  $\frac{36411}{414960}$ , the part of the work  
 which all could do in 1 day, we take, successively,  
 the parts which B, C, D, and E; A, C, D, and E;  
 A, B, D, and E; etc., can do in one day, we shall  
 have the parts which A, B, C, D, and E can do,  
 separately, in 1 day, thus :

$$\frac{36411}{414960} - \frac{7980}{103740} = \frac{4491}{414960}, \text{ A can do in one day;}$$

$$\frac{36411}{414960} - \frac{6916}{103740} = \frac{8747}{414960}, \text{ B " "}$$

$$\frac{36411}{414960} - \frac{8645}{103740} = \frac{1931}{414960}, \text{ C " "}$$

$$\frac{36411}{414960} - \frac{5460}{103740} = \frac{4571}{414960}, \text{ D " "}$$

$$\frac{36411}{414960} - \frac{7410}{103740} = \frac{6771}{414960}, \text{ E " "}$$

$$\text{Therefore, } 414960 \div 4491 = 92\frac{1788}{4491} \text{ da. req'd for A;}$$

$$414960 \div 8747 = 47\frac{3852}{8747} \text{ " B;}$$

$$414960 \div 1931 = 214\frac{1726}{1931} \text{ " C;}$$

$$414960 \div 4571 = 90\frac{3570}{4571} \text{ " D;}$$

$$414960 \div 6771 = 61\frac{929}{6771} \text{ " E.}$$

Hence B will do the work in the shortest time.

Ex. 81 The first has 1 share;

the second has  $1 \times 1\frac{1}{2} = 1\frac{1}{2}$  "

the third has  $1\frac{1}{2} \times 1\frac{1}{2} = 2\frac{1}{4}$  "

All have  $4\frac{3}{4}$  "

$4\frac{3}{4} : 1 = \$500 : (?) = \$105\frac{5}{9}$ , 1st has;

$4\frac{3}{4} : 1\frac{1}{2} = \$500 : (?) = \$157\frac{17}{9}$ , 2d "

$4\frac{3}{4} : 2\frac{1}{4} = \$500 : (?) = \$236\frac{16}{9}$ , 3d "

Ex. 82.  $\$2500 \times 5 = \$12500$  for 1 mo.;

$\$5500 \times 7 = 38500$  " "

B's investments =  $\$51000$  " "

$\$1333\frac{1}{3} \div 51000 = \$\frac{4}{153}$ , B's (and also A's) gain per month on each \$1 of capital invested.

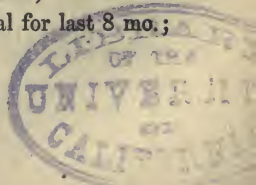
$\$5000 \times \frac{4}{153} \times 4 = \$522\frac{134}{153}$ , A's gain during the first 4 months;

$\$1066\frac{2}{3} - \$522\frac{134}{153} = \$543\frac{121}{153}$ , A's gain during the last 8 months;

$\$ \frac{4}{153} \times 8 = \$\frac{32}{153}$ , gain on \$1 in 8 mo.;

$\$543\frac{121}{153} \div \frac{32}{153} = \$2600$ , A's capital for last 8 mo.;

$\$5000 - \$2600 = \$2400$ , Ans.



Ex. 83. There will be 4 intervals of time each  $\frac{1}{2}$  year, and the rate 5 %; hence

$$\$12750 \div 1.215506 = \$10489.459 -, \text{ Ans.}$$

Ex. 84. The proceeds of \$1 for 93 da. are \$.9819 $\frac{1}{8}$ ; and since he sells at 120 % of the purchase price, he realizes 120 %  $\times$  .9819 $\frac{1}{8}$  = 117.83 % in ready money. Deducting 5 % + 2 % = 7 % for expenses, we have 117.83 % - 7 % = 110.83 %, his rate of net receipts on each investment. Hence

$$\$1500 \times 1.1083 = \$1662.45, \text{ net proceeds 1st sale;}$$

$$\$1662.45 \times 1.1083 = 1842.53 +, \text{ " " 2d "}$$

$$\$1842.53 \times 1.1083 = 2042.07 +, \text{ " " 3d "}$$

$$\$2042.07 \times 1.1083 = 2263.23 +, \text{ " " 4th "}$$

$$\$2263.23 - \$1500 = 763.23, \text{ whole gain, Ans.}$$

Ex. 85.  $\$.80 \times 1.20 = \$.96$ , what it must sell for; and since the selling price is 100 % - 10 % = 90 % of the asking price, we have  $\$.96 \div .90 = \$1.06\frac{2}{3}$ , Ans.

Ex. 86.  $25 \times 20 = 500$  yd.

$$\$4\frac{3}{8} \times 500 = \$2187.50, \text{ purchase price;}$$

$$\$4\frac{5}{8} \times 500 = 2312.50, \text{ selling "}$$

$$\$2312.50 \div 1.02 = \$2267.15, \text{ cash value of sale;}$$

$$\$2187.50 \div 1.045 = 2093.30, \text{ " purchase.}$$

---


$$\$173.85, \text{ Ans.}$$

Ex. 87.  $\$1200 \div 200 = 6$ , number of payments;

$$(1.08^6 - 1) \times 200$$

---


$$.08 = \$1437.185, \text{ amount of the annuity}$$

at the maturity of the last installment. And since this sum will be at compound interest for  $10 - 6 = 4$  years,  $\$1467.185 \times 1.360489 = \$1996.07 +$ , Ans.



Ex. 88. The amount of an annuity of \$3000 in arrears for  

$$(1.06^{10}-1) \times \$3000$$
  
 10 years, is  $\frac{\quad}{.06} = \$39542.40$ .

The present worth of this sum, due 10 years hence,  
 is  $\$39542.40 \div 1.790848 = \$22080.28$ , the value of  
 the bequest to the eldest son.

The present value of the same sum due 20 years  
 hence is  $\$39542.40 \div 3.207136 = \$12329.51$ , the val-  
 ue of the bequest to the second son.

The worth of the perpetuity when entered upon by  
 the institution, was  $\$3000 \div .06 = \$50000$ .

But, as the perpetuity is not to be entered upon till  
 20 years after the man's decease, its present value is  
 $\$50000 \div 3.207136 = \$15590.23$ .

Ex. 89. It requires  $5+1=6$  days for the horse team to per-  
 form the trip and rest a day,  $7+1=8$  days for the  
 mule team, and  $11+1=12$  days for the ox team to  
 do the same. Now, the least common multiple of 6  
 da., 8 da. and 12 da is 24 da. Therefore the three  
 teams will rest together on the 24th day, and conse-  
 quently  $24-1=23$  da. must elapse before this day  
 comes.

Ex. 90. The four payments must be treated according to the  
 U. S. rule for Partial Payments; that is, the pay-  
 ment each year will cancel the interest which has  
 accrued on the principal for that year, together with  
 a certain portion, or *installment*, of the principal it-  
 self. Now, the principal for the second year will be  
 less than the principal for the first year, by the value  
 of the first installment; and consequently the inter-  
 est to be canceled by the second payment will be



less than the interest canceled by the first payment, by one year's, interest, or 6 %, of the first installment. Hence the second installment will *exceed* the first, by the same sum; that is, the second installment will be 1.06 times the first. For a similar reason, the third will be 1.06 times the second; and so on. Therefore, these installments of the principal form a geometrical series, of which the 1st installment = first term, 4 = No. terms, and \$4500 = sum of the series. We may find the first term by reversing the rule under **715**, thus:

$$\frac{(1.06-1) \times \$4500}{1.06^4 - 1} = \$1028.67 + = \text{1st term, or that}$$

part of the principal canceled by the first payment. But the payment must also cancel the interest of the principal for that year, which is  $\$4500 \times .06 = \$270$ ; hence  $\$1028.67 + \$270 = \$1298.67$ , *Ans.*

**Ex. 91.** Of the payments coming due after Jan. 1, 1864, one is to be discounted for 2 half years at 6 % per annum, or for 2 intervals at 3 %; and the other for 4 intervals at 3%. Hence

$$\begin{array}{rcl} \$1050, & 4\text{th payment;} & \\ \$1050 \div 1.0609 = \$ & 989.725 +, & \text{present val. 5th pay't.} \\ \$1050 \div 1.125509 = & 932.911 +, & \text{" 6th " } \\ \hline & \$2972.636 +, & \text{Ans.} \end{array}$$

**Ex. 92.**  $2 \times 3 = 6$ ;  $864 \div 6 = 144$ ;  $\sqrt{144} = 12$ ;

$3 \times 12 = 36$ , No. of rows;

$2 \times 12 = 24$  " trees in each row.

And since the spaces between the trees are 1 less, each way, than the number of trees,

$(36-1) \times 7 = 245$  yd., length of the orchard ;

$(24-1) \times 7 = 161$  yd., breadth “ “

$245 \times 161 = 39445$  sq. yd., *Ans.*

Ex. 93.  $\$2500 \times 1.06 = \$2650$ , first cost ;

$\$2650 \times 1.225043 = \$3246.36$ , amount for 3 yr.;

$\$3246.36 \times 1.0175 = 3303.17$ , “ 3 yr. 3 mo.,

which is to be considered as the whole cost of the investment.

Now, there were received 6 dividends of \$100 each, received 2 yr. 9 mo., 2 yr. 3 mo., 1 yr. 9 mo., 1 yr. 3 mo., 9 mo., and 3 mo., respectively, before the sale of the stock. Hence, reckoning compound interest,

Amt. of \$100 for 2 yr. 9 mo. = \$120.50

“ “ 2 “ 3 “ = 116.49

“ “ 1 “ 9 “ = 112.62

“ “ 1 “ 3 “ = 108.87

“ “ 9 “ = 105.25

“ “ 3 “ = 101.75

---

Value of dividends, \$ 665.48

Sale of stock,  $\$2500 \times 1.11 = 2775.00$

---

Whole sum realized, \$3440.48

$\$3440.48 - \$3303.17 = \$137.31$ , *Ans.*

Ex. 94. *First*, the number in the smallest company is 4, and in the largest 64, and the number in each company is double the number in the preceding company. Hence the companies are, respectively, 4, 8, 16, 32, 64. There are therefore 5 companies, and the total

number of men is  $\frac{(2^5-1) \times 4}{2-1} = 124$ .

*Second*, The smallest company received \$.50 each

per day, the largest \$1.50 each, and the common difference of the rates of daily wages is \$.25. Hence the daily rates in the respective companies are \$.50, \$.75, \$1.00, \$1.25, \$1.50.

Now, if we multiply these rates of daily wages, each by the number of men in the respective companies, and add the products, we shall obtain the whole sum paid per day, thus :

\$ .50,	\$ .75,	\$ 1.00,	\$ 1.25,	\$ 1.50
4	8	16	32	64

\$2.00 + \$6.00 + \$16.00 + \$40.00 + \$96.00 = \$160  
paid per day ;

\$160 × 6 = \$960, weekly payment.

## MENSURATION.

(731, page 425.)

Ex. 1.  $(24 + 15) \times 2 = 78$  ft., perimeter of the room ;

$78 \times 8\frac{1}{2} = 663$  sq. ft. in the walls ;

$24 \times 15 \times 2 = 720$  " " in floor and ceiling ;

$1383$  sq. ft. =  $153\frac{2}{3}$  sq. yd., *Ans.*

Ex. 2. Let A B C D E F represent the farm.

If we extend the line D E to G, the land will be divided into two rectangles,

G B C D, and A G E F. Since B C =



$25.14$  ch., and C D =  $12.08$  ch., we have  $25.14 \times 12.08 = 303.6912$  sq. ch., area of G B C D. Again, since E F =  $26.12$  ch., and F A =  $16.84$  ch.,  $26.12 \times 16.84 = 439.8608$  sq. ch., area of A G E F. Then

(424, 425)

$$439.8608 + 303.6912 = 743.552 \text{ sq. ch.} = 74.3552 \text{ A.} \\ = 74 \text{ A } 56.8 + \text{P., Ans.}$$

Ex. 3.  $240 \div 20 = 12 \text{ rd., Ans.}$

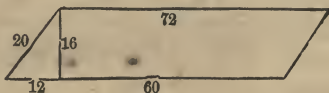
Ex. 4.  $70 \text{ A.} = 11200 \text{ sq. rd.}; 11200 \div 120 = 93\frac{1}{3} \text{ rd., Ans.}$

Ex. 5.  $40 \text{ A.} = 400 \text{ sq. ch.}; 400 \div 8 = 50 \text{ ch., Ans.}$

(732, page 426.)

Ex. 1.  $28 \text{ ft. } 9 \text{ in.} = 28\frac{3}{4} \text{ ft.};$   
 $36 \times 28\frac{3}{4} = 1035 \text{ sq. ft.} = 3 \text{ sq. rd. } 218\frac{1}{4} \text{ sq. ft., Ans.}$

Ex. 2.  $\sqrt{20^2 - 12^2} = 16;$   
 $72 \times 16 = 1152 \text{ P.}$   
 $= 7 \text{ A. } 32 \text{ P., Ans.}$



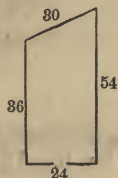
Ex. 3.  $14 \text{ A. } 72 \text{ P.} = 2312 \text{ P.}$  Now, by **691**,  $1 \times 2 = 2$ , product of the proportional terms;  $2312 \div 2 = 1156$ ;  $\sqrt{1156} = 34$ ;  $34 \times 1 = 34$ , shorter side;  $34 \times 2 = 68$ , longer side; and  $68 \times 30 = 2040 \text{ P.} = 12 \text{ A. } 120 \text{ P.}$

(733, page 426.)

Ex. 1.  $\frac{72.40 + 84.36}{2} = 78.38 \text{ ch., half sum of parallel sides};$   
 $78.38 \times 30.25 = 2370.995 \text{ sq. ch.} = 237 \text{ A. } 15.92 \text{ P.}$

Ex. 2.  $\frac{26 + 9}{2} = 12\frac{1}{2} \text{ in., average width};$   
 $(12\frac{1}{2} \times 12) \div 12 = 12\frac{1}{2} \text{ sq. ft., Ans.}$

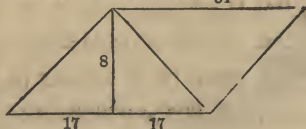
Ex. 3.  $\frac{36 + 54}{2} = 45 \text{ rd.};$   
 $45 + 24 = 1080 \text{ P.} = 6 \text{ A. } 120 \text{ P., Ans.}$



(734, page 427.)

Ex. 1.  $126 \times \frac{2}{3} = 84 \text{ sq. ft.} = 168 \text{ sq. yd., Ans.}$

Ex. 2. The two gable ends together make a parallelogram, whose length is



(425—427)

34 ft., and perpendicular 8 ft. Hence

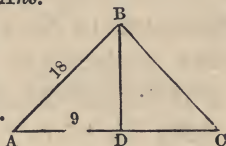
$$34 \times 8 = 272 \text{ sq. ft., Ans.}$$

Ex. 3.  $48 \div 12 = 4 \text{ ft.} = \text{one-half the perpendicular;}$   
 $4 \text{ ft.} \times 2 = 8 \text{ ft., Ans.}$

Ex. 4.  $108 \div 9 = 12 \text{ ft.}; 12 \text{ ft.} \times 2 = 24 \text{ ft., Ans.}$

Ex. 5.  $\frac{18 \times 15}{2} = 135 \text{ sq. rd., Ans.}$

Ex. 6.  $\sqrt{18^2 - 9^2} = 15.588$   
 $+ \text{ft.} = \text{BD}; 15.588$   
 $\times \frac{18}{2} = 140.29 + \text{sq. in.}$



(735, page 428.)

Ex. 1.  $8 \text{ ft.} \times 3.14159 = 25.13272 \text{ ft.} = 25 \text{ ft. } 1.59 + \text{ in.}$

Ex. 2.  $49.52 \times .31831 = 15.762 + \text{rods, Ans.}$

Ex. 3.  $4 \text{ ft. } 8\frac{1}{2} \text{ in.} = 56.5 \text{ in.}; 56.5 \times 2 = 113 \text{ in., diameter;}$   
 $113 \times 3.14159 = 355 - \text{ in., circumference;}$   
 $18^\circ = \frac{18}{360} = \frac{1}{20} \text{ of a circumference;}$   
 $355 \text{ in.} \times \frac{1}{20} = 17.75 \text{ in.} = 1 \text{ ft. } 5.75 \text{ in., Ans.}$

Ex. 4.  $66 \text{ ch.} = 264 \text{ rd.};$   
 $264 \times .31831 = 84.03384 \text{ rd., diameter of garden;}$   
 $66 \times .31831 = 21.00846 \text{ " " " pond;}$

2)  $68.02558 \text{ rd., twice the width of ring;}$

$31.51 + \text{ rd., Ans.}$

Ex. 5.  $16.5 \times .31831 = 5.25 + \text{ ft.} = 5 \text{ ft. } 3 + \text{ in., Ans.}$

(736, page 428.)

Ex. 1.  $\frac{226 \times 710}{4} = 40115, \text{ Ans.}$

Ex. 2.  $25^2 \times .7854 = 490.875 \text{ sq. in., Ans.}$

Ex. 3.  $6 \text{ ft. } 10 \text{ in.} = 82 \text{ in.};$   
 $82^2 \times .07958 = 535.1 + \text{sq. in.} = 3 \text{ sq. ft. } 103.1 \text{ sq. in.}$

(427, 428)



**Ex. 4.**  $6.44598 \div .07958 = 81$  ch., square of circumference;  
 $\sqrt{81} = 9$  ch. = 9 ch. = 36 rd., *Ans.*

**Ex. 5.**  $8^2 \times .7854 = 50.2656$  sq. rd., area of circle;  
 $50.2656 \div 4 = 12.5664$  sq. rd., *Ans.*

(744, page 429.)

**Ex. 1.**  $16^3 = 4096$  cu. ft., *Ans.*

**Ex. 2.**  $15 \times 3 \times \frac{11}{12} = 41\frac{1}{4}$  cu. ft., *Ans.*

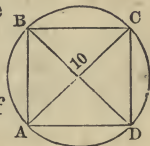
**Ex. 3.**  $\sqrt{1^2 - .5^2} = \sqrt{.75} = .866$  ft. +, altitude of triangle;  
 $.866 \times .5 = .433$  sq. ft., surface of the end;  
 $24 \times .433 = 10.39$  + cu. ft., *Ans.*

**Ex. 4.**  $.7854 \times 9^2 \times 9\frac{1}{2} \times 1728 = 1044343.2384$  cu. in.;  
 $1044343.2384 \div 231 = 4520.96$  + gal. =  
 71 hhd. 47.96 + gal., *Ans.*

**Ex. 5.** Let A B C D be the end of the log when hewn square.

$$\overline{BC}^2 + \overline{BA}^2 = 2 \overline{BC}^2 = \overline{AC}^2 = 100.$$

Hence,  $\overline{BC}^2 = 50$  sq. ft., the area of the square end.



$$.7854 \times 10^2 \times 20 \times 12 = 18849.6 \text{ cu. in. in whole log;} \\
50 \text{ sq. ft.} \times 20 \times 12 = 12000 \quad \text{“ “ sq. timber;}$$

---


$$6819.6 \text{ cu. in.} = 3 \text{ cu. ft.}$$

1665.6 cu. in., *Ans.*

**Ex. 6.** 1 h. 20 min. = 4800 sec. Hence the quantity of water discharged will be equal to the contents of a tube 2 in. in diameter, and  $12 \text{ in.} \times 4800 = 57600$  in. in length.;  $.7854 \times 2^2 \times 57600 = 180956.16$  cu. in.;  $180956.16 \text{ cu. in.} \div 231 = 783.36$  + gal., *Ans.*

**Ex. 7.**  $29 - 23 = 6$ ;  $\frac{2}{3}$  of 6 = 4;  $23 + 4 = 27$  in., mean diameter.  
 $.7854 \times 27^2 \times 36$   


---


$$= .0034 \times 27^2 \times 36 = 89.2296 \text{ gal.}$$

231

- Ex. 8.**  $28 - 25 = 3$ ;  $\frac{6}{10}$  of  $3 = 1.8$ ;  $25 + 1.8 = 26.8$  in., mean diameter. And since  $.7854 \div 231 = .0034$ ,  
 $.0034 \times 26.8^2 \times 35 = 85.47056$  gal., *Ans.*

(745, page 430.)

- Ex. 1.**  $17^2 \times 12 = 3468$  cu. ft., solid contents.  
 From the foot of the perpendicular to the middle of one side of the base is  $17 \div 2 = 8.5$  ft. Hence,  
 $\sqrt{36^2 + 8.5^2} = 36.99$  ft., the slant height;  $36.99 \times 8.5 \times 4 = 1257.66$  sq. ft., lateral surface.

- Ex. 2.**  $51\frac{1}{2}$  ft.  $= 5.916666 +$  ft.;  
 $5.916666^2 \times .07958 = 2.78584 +$  sq. ft., area of base;  
 $2.78584 \times \frac{5}{3} = 4.64306 +$  cu. ft., *Ans.*

- Ex. 3.** From the solution of Ex. 5, 744, we learn that the square of the diameter of a circle is equal to twice the area of the square that may be drawn within it. Hence,

$$\begin{aligned} 7^2 \\ \frac{\text{---}}{2} &= 24.5 \text{ sq. ft., area of the base of the pyramid;} \\ 24.5 \times \frac{18}{3} &= 24.5 \times 6 = 147 \text{ cu. ft., } \textit{Ans.} \end{aligned}$$

- Ex. 4.**  $\frac{30 \times 25}{2} \times 4 = 1500$  sq. ft. in the convex surface;  
 $30^2 = 900$  " " " base;

2400 sq. ft. in entire surface.

Now, since the slant height is 25 ft., and a line from the middle of one side of the base to the foot of the perpendicular is 15 ft., we have

$$\begin{aligned} \sqrt{25^2 - 15^2} &= 20 \text{ feet, the altitude;} \\ \text{and } 30^2 \times \frac{20}{3} &= 6000 \text{ cu. ft., solid contents.} \end{aligned}$$

- Ex. 5**  $30 \times \frac{18}{2} = 270$  sq. in.  $= 1$  sq. ft. 126 sq. in., convex surface;  $30 \times .31831 = 9.5493$  in., diameter of the base;  $9.5493 \text{ in.} \div 2 = 4.77465$  in., radius. Now,

(430, 431)

since the slant height of the cone and the radius of the base form the hypotenuse and base of a right-angled triangle, of which the other side is the altitude of the cone,

$$\sqrt{18^2 - 4.77465^2} = 17.3580 + \text{in., altitude};$$

$$30^2 \times .07958 = 71.622 \text{ sq. in., area of base};$$

$$\frac{71.622 \times 17.358}{3} = 1243.21 + \text{cu. in., solidity}.$$

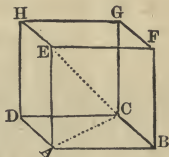
(746, page 431.)

**Ex. 1.**  $4^2 \times 3.1416 = 50.2656 \text{ sq. ft., Ans.}$

**Ex. 2.**  $8.5^3 \times .5236 = 321.55 + \text{cu. in., Ans.}$

**Ex. 3.** 
$$\frac{12^3 \times .5236}{2} = 452.39 + \text{cu. in., Ans.}$$

**Ex. 4.** Since the corners of the inclosed cube will touch the surface of the sphere, the *diagonal* of the cube, *E C*, will be the diameter of the sphere, or 12 ft. Now, remembering that *A E*, *A B*, and *B C*, are all equal, being each a side of the cube, we have  $(A E)^2 + (A C)^2 = (E C)^2$ . But  $(A C)^2 = (A B)^2 + (B C)^2$ , or  $2(A B)^2$ , or  $2(A E)^2$ . Hence,  $3(A E)^2 = (E C)^2 = 12^2 = 144$ , and  $144 \div 3 = 48 = (A E)^2$ ;  $\sqrt{48} = 6.928 + \text{ft.} = A E., \text{Ans.}$



**Ex. 5.**  $65.45 \div .5236 = 125$ , cube of diameter;  
 $\sqrt[3]{125} = 5 \text{ in., Ans.}$

**Ex. 6.** Reversing the rule for finding the surface,  $78.54 \div 3.1416 = 25$ , the square of the diameter; and  $\sqrt{25} = 5 \text{ in., the diameter.}$  Then, by the rule for finding the solid contents,  $5^3 \times .5236 = 65.45 \text{ cu. in., the capacity.}$

Ex. 7.  $14^3 \times .5236 = 1436.7584$  cu. in. in larger globe,  
 $12^3 \times .5236 = 904.7808$  " " " smaller "  


---

 $531.9776$  cu. in., *Ans.*

(747, page 432.)

Ex. 1. 1 gal. = 231 cu. in. Hence  $231 \div 2 = 115.5$  cu. in.,  
the contents of the lead;  $\$.15 \times 115.5 = \$17.325$ .

Ex. 2. 6 gal. 3 qt. 1 pt. =  $6\frac{7}{8}$  gal.;  $8\frac{1}{4}$  gal. —  $6\frac{7}{8}$  gal. =  $1\frac{3}{8}$   
gal., the solidity of the anvil. Hence,  
 $231$  cu. in.  $\times 1\frac{3}{8} = 317\frac{5}{8}$  cu. in., *Ans.*

Ex. 3.  $8^3 = 512$  cu. in., contents of box;  
 $3\frac{3}{4}$  qt. =  $1\frac{5}{8}$  gal. =  $216\frac{9}{16}$  cu. in., deficiency;  


---

 $295\frac{7}{16}$  cu. in., *Ans.*

(748, page 432.)

Ex. 1. The diameters will be to each other as the cube roots  
of 64 and 512, as 4 to 8, or as 1 to 2.

Ex. 2. Since the blocks are to each other as 105 to 2835,  
or as 1 to 27, the lengths will be as  $\sqrt[3]{1}$  to  $\sqrt[3]{27}$ ,  
or as 1 to 3. Hence  $7$  in.  $\times 3 = 21$  in., *Ans.*

Or,  $105 : 2835 = 7^3 : (?) = 9261$

$\sqrt[3]{9261} = 21$  in., *Ans.*

Ex. 3.  $\sqrt[3]{1} : \sqrt[3]{3} = 2$  ft. : (?) =  $2$  ft.  $\times 1.4422 = 2.8844$  ft.  
= 2 ft. 10.6+ in., *Ans.*

Ex. 4. Since the contents of the required cellar will be  $18$   
 $\div 6 = 3$  times the contents of the given cellar, its several  
dimensions will be  $\sqrt[3]{3} = 1.4422$  times the given  
dimensions. Hence

$14$  ft.  $\times 1.4422 = 20.1908$  ft., length;

$12$  ft.  $\times 1.4422 = 17.3064$  ft., width;

$6$  ft.  $\times 1.4422 = 8.6532$  ft., depth.

(431, 432)

Ex. 5.  $9000 \div 217 = 41.474 +$ , ratio of the contents;  
 $\sqrt[3]{41.474} = 3.46 +$ , ratio of respective dimensions;  
 $20 \text{ in.} \times 3.46 = 69.2 + \text{ in.}$ , length;  
 $15 \text{ in.} \times 3.46 = 51.9 + \text{ in.}$ , breadth;  
 $8 \text{ in.} \times 3.46 = 27.6 + \text{ in.}$ , thickness.

Ex. 6. A will take off a pyramid containing 4 tons; A and B, a pyramid containing 8 tons; and A, B and C, a pyramid containing 12 tons. And, since these pyramids are similar figures, they will be to each other as the cubes of their altitudes. Hence, comparing the whole pyramid with each pyramid taken off,

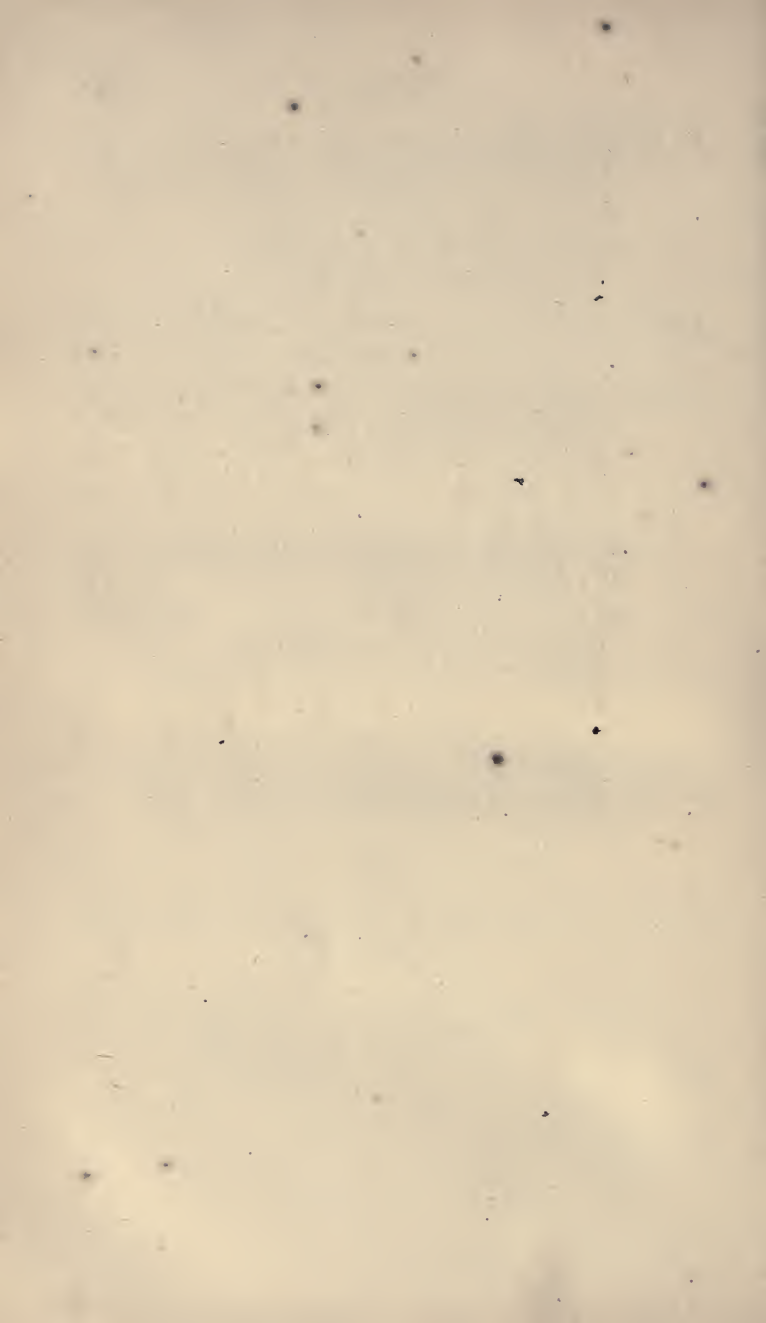
Tons. ft.

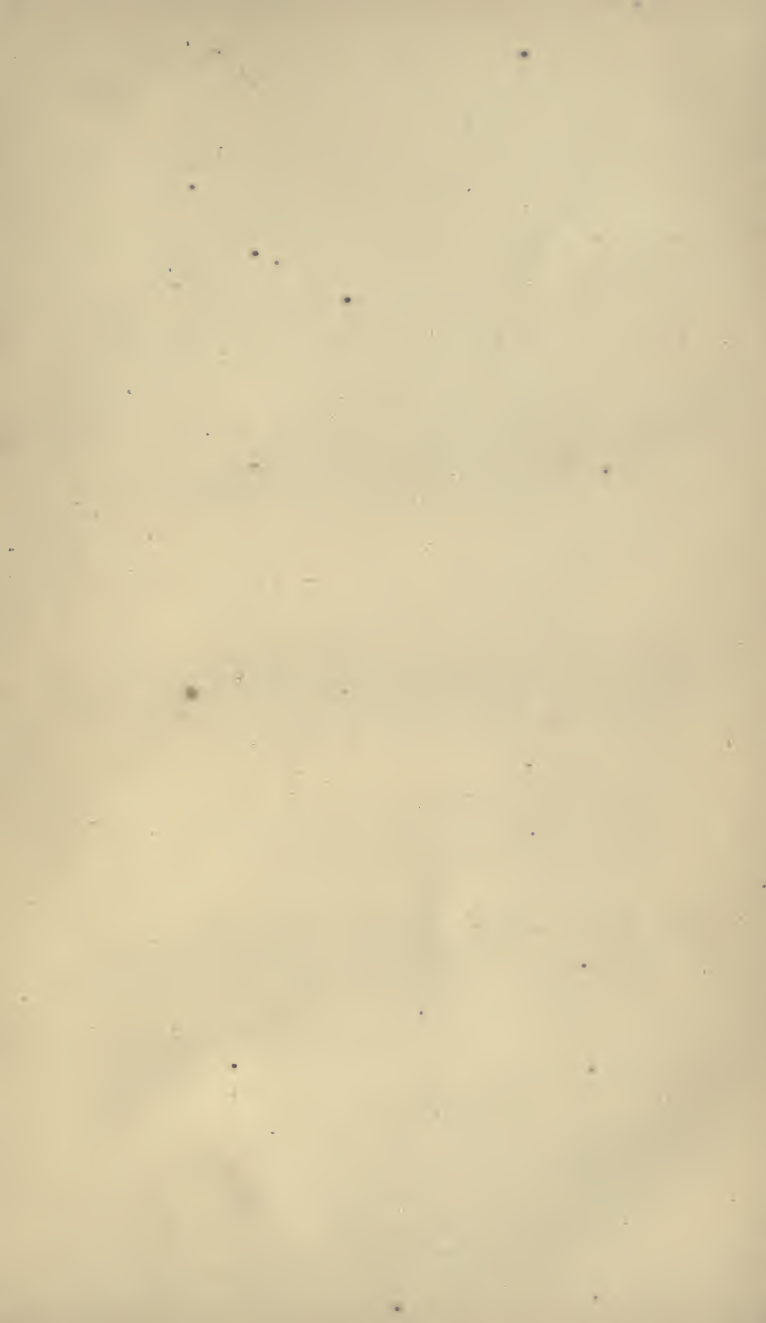
16 : 4 =  $16^3$  : (?) = 1024, cube of height taken by A;  
 16 : 8 =  $16^3$  : (?) = 2048, " " A and B;  
 16 : 12 =  $16^3$  : (?) = 3072, " " A, B and C;  
 $\sqrt[3]{1024} = 10.079 \text{ ft.}$ , taken off by A;  
 $\sqrt[3]{2048} = 12.699$  " " " A and B;  
 $\sqrt[3]{3072} = 14.537$  " " " A, B and C  
 $12.699 - 10.079 = 2.620 \text{ ft.}$ , taken off by B;  
 $14.537 - 12.699 = 1.838$  " " C;  
 $16.000 - 14.537 = 1.463$  " " D

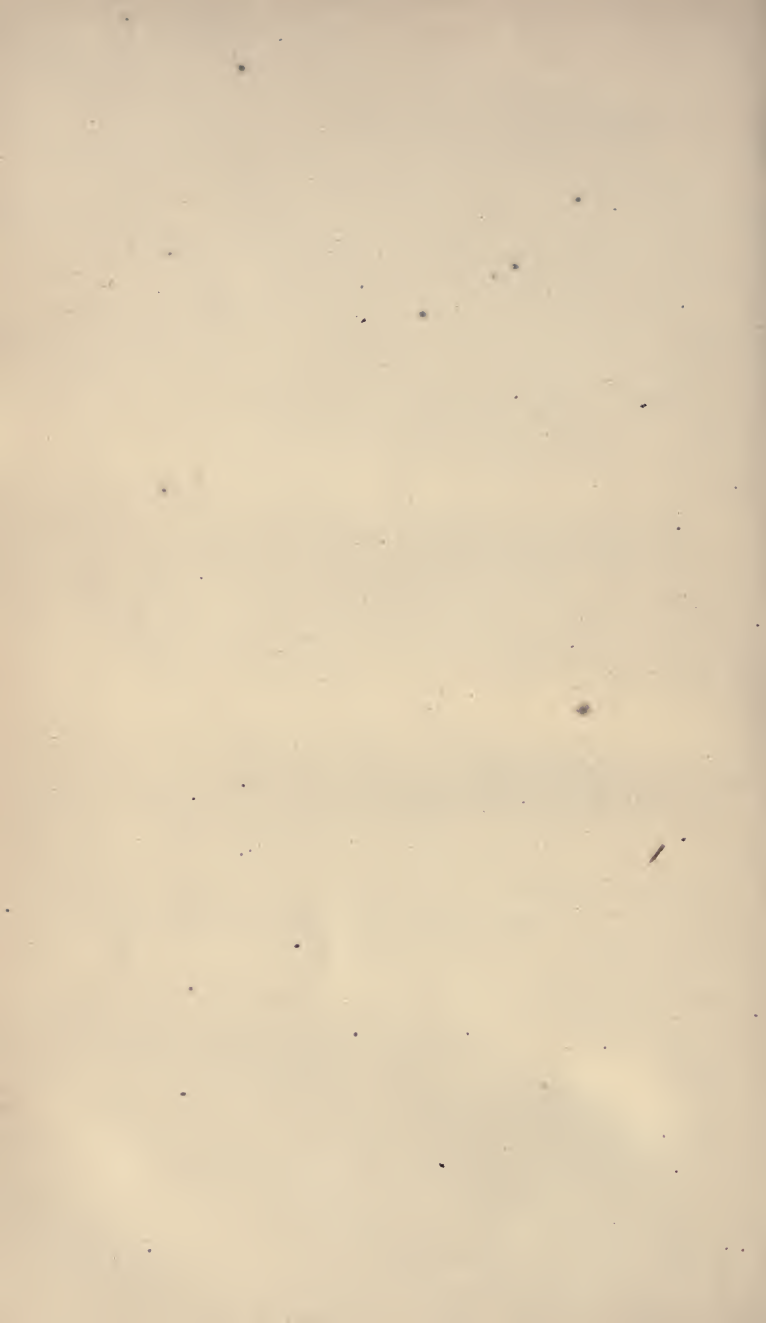
(432)







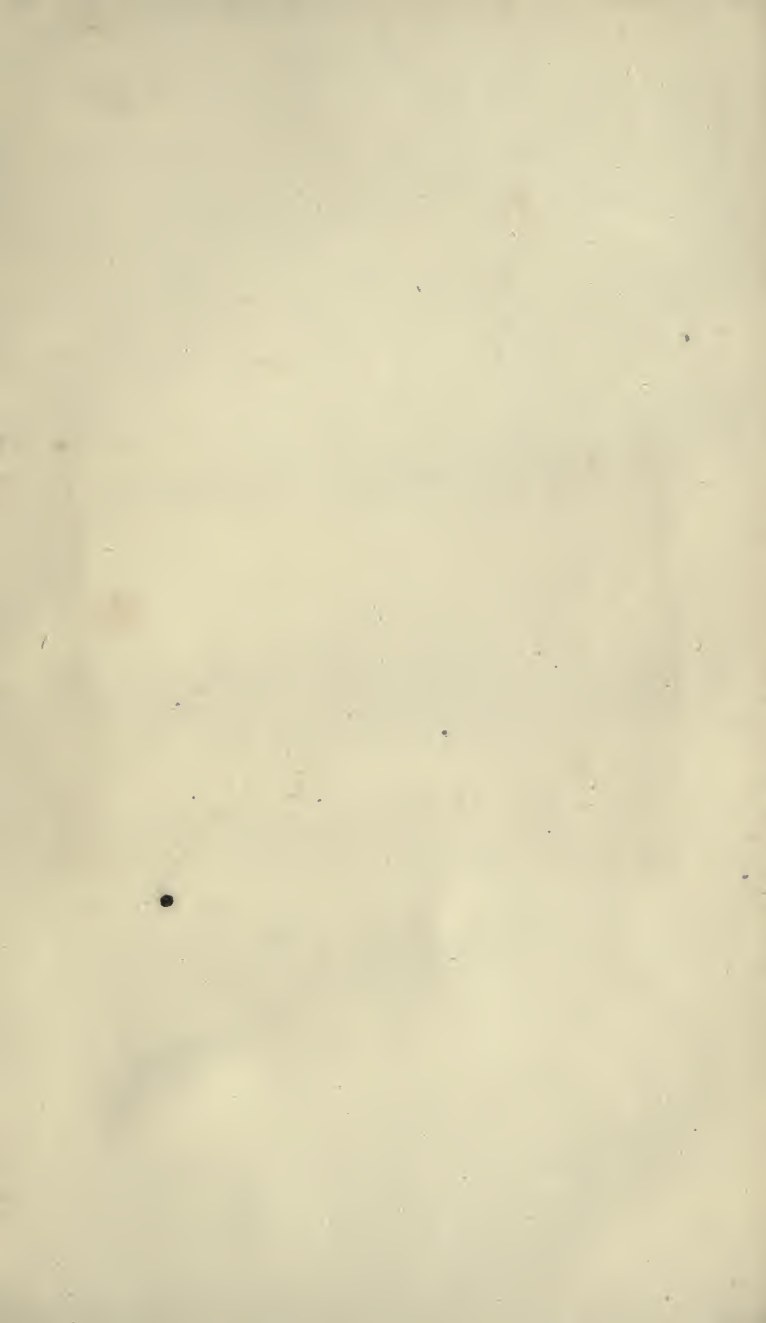
















THIS BOOK IS DUE ON THE LAST DATE  
STAMPED BELOW

AN INITIAL FINE OF 25 CENTS  
WILL BE ASSESSED FOR FAILURE TO RETURN  
THIS BOOK ON THE DATE DUE. THE PENALTY  
WILL INCREASE TO 50 CENTS ON THE FOURTH  
DAY AND TO \$1.00 ON THE SEVENTH DAY  
OVERDUE.

FEB 9 1938

LD 21-95m-7,'37

QA102  
R5-6

67531

UNIVERSITY OF CALIFORNIA LIBRARY



